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Oil And The Atom: Partners Or Competitors?

ABSTRACT

The partnership between oil and the atom is proved by the many examples of the usefulness of the "atom" to the oil industry. In geophysical exploration, drilling, production, pipe-line transportation, refinery practice, and research, atomic energy techniques and byproducts have been seized upon by the petroleum industry and turned to good use.

As competitors, the case for the "atom" rests on future developments which will require years of experimentation and experience. In two cases there is a reasonable, immediate hope for atomic power. The first concerns locations remote from supplies of conventional fuels where modest electric power requirements (5,000-kw to 25,000-kw) are met by Diesel units today. And the second viz., submarines, removes economic considerations in favor of national security. Economic central-station nuclear power plants appear at least a decade away.

However, should the atomic energy act be modified to remove the AEC monopoly on ownership of facilities for producing fissionable material itself, industrial interest and participation in these activities would be stimulated. The difficulties arising in such a policy change should be surmounted.

W. L. Davidson
Director, Office of Industrial Development, United States Atomic Energy Commission, Washington, D. C.

During my childhood years, whenever our family was invited out, my mother was always quick to remind me ere we left home that in adult company little boys should be seen, not heard. Were I to follow this advice today, I would have little to say, because the field which I represent, atomic energy, is but a 10-year stripling compared with Colonel Drake's petroleum industry which will soon attain that venerable age of a century. Still it is true that, while Jack Dempsey was blasting aside all opposition in the '20's, Joe Louis was a mere lad in Alabama. And later, while the "brown bomber" was putting his adversaries to sleep with regularity, the present heavyweight champion was playing hide-and-seek with his playmates in Brockton, Mass. Consequently, it might be inferred that the petroleum industry had best look to its laurels once this new energy challenger puts on a few more pounds, and attains full growth in the form of further technological advances. As a proponent of the peacetime atom, I would not hesitate to predict that one day my boy will take the championship, if I thought I could make such a statement stick. However, in all candor, I must confess that my fighter has a few weaknesses. I'll stack his Sunday punch against the best of them, as witness Hiroshima and Nagasaki, but thus far he is somewhat lacking in finesse and has developed definite champagne tastes which he will have to overcome if he ever hopes to make the grade. Most of us who have watched him in training think he has what it takes, but a few "ring" experts like Dr. James Conant contend he will always be a stumble-bum. In the words of a current cigarette "ad," "only time will tell."

Complementary

The most likely appraisal is perhaps found in another analogy. Just as the pony, the work horse and the racing thoroughbred can each justify its existence as a member of the equine family, so do I believe that coal, petroleum, natural gas, and atomic energy will also maintain or carve out suitable roles for themselves in supplying the future energy needs of this power-hungry planet, and that all of them will be needed to tide us over until we learn how to utilize efficiently the one source of energy which seems inexhaustible —sunlight. Thus, to a considerable degree, atomic energy and petroleum will not compete, but will, rather, complement each other in the years ahead. Already there is ample evidence of this complementary relationship.

Oil-Industry Applications

The atomic energy program to date has borrowed many of the material-handling and process-control techniques common to the refining industry; and, conversely, you petroleum people have been quick to seize on applications of atomic energy developments and byproducts to assist in increasing the efficiency of your own operations. Let me take a moment to mention some of the ways in which atomic energy has already been, or is expected to

Geophysical Prospecting

I am told that oil, like gold, is where you find it. Furthermore, as

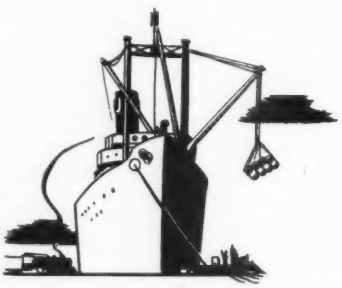
time goes on, it is common knowledge that finding new oil fields is becoming more and more expensive. One interesting new technique which offers promise in reversing this trend involves flying low over a land area holding geological promise for oil, plotting the radioactivity registered by a scintillation counter mounted in the plane. The counter responds to the radioactive material in roughly the top 4-ft. to 6-ft. layer of earth directly under the plane. It has been noted that the ground surface surrounding known oil-field areas shows abnormally low radioactivity response. The theory underlying this phenomenon is that the radioactive content of surface soil is gradually leached out by rainfall and surface-water runoff, but that this is normally replaced by a gradual diffusion of ground water from deep in the earth, the latter containing traces of radium chloride. An oil pool effectively blocks this replacement diffusion process, and consequently, the ground above such an oil pool will have less than its normal content of radioactive material. If this technique lives up to its initial promise, the ratio of producer wells to dry holes drilled may be upped considerably.

Drilling

Once an oil well has been drilled, atomic energy techniques can also be used to learn something about the surrounding strata encountered in the well. For many years it has been known that formations of shale and of granite are generally associated with a higher natural radiation intensity than, for example, rock salt, limestone, water, or oil. The conditions more favorable to encountering oil are those in which a fluid-filled, porous zone occurs between two layers of hard rock. (Unfortunately, such zones may also contain water.)

Gamma-ray logging has, therefore, been used to detect changes in the overall radioactivity of the strata as a function of the depth of the well. The sequence of such changes is compared carefully with other producing wells in the same general area, paying particular attention to sharp minima in the activity.

By means of a relatively new bombardment technique a further differentiation can be made, inasmuch as hydrogenous materials such as oil or water react quite differently when bombarded with a stream of neutrons than do non-hydrogenous materials such as granite, sand, limestone, or salt. A stream of fast neutrons impinging on a non-hydrogenous target of reasonably high atomic number emits high-energy gamma radiation through a neutron inelastic scattering process. This secondary gamma radiation can be recorded by suitable radiation-detection instruments. Neutrons striking a target rich in hydrogen atoms are slowed down and absorbed. The secondary gamma radiation emitted in this case is much less energetic, and the reading on the instrument is, therefore, reduced. This principle is used today to supplement the ordinary gamma-ray log.



A combination of a high primary and a high secondary gamma radiation indicates that the stratum is probably granite. Within such a stratum, a localized combination of a low primary and a low secondary gamma radiation indicates a porous zone which may contain oil (or water). A high primary and a low secondary gamma radiation may indicate a shale formation. Other combinations indicate the presence of salt, limestone, or sand.

One of the several advantages of the gamma-neutron well-logging method is that extremely accurate records can be kept of the position and thickness of the strata. It is, therefore, possible by gun-penetration methods to open the casing at precisely the point corresponding to the hoped-for oil-bearing layer. It is likewise possible to seal off water-bearing layers. The accuracy in location is said to be 2 ft. regardless of the depth of the well.

Another way in which the by-products of atomic energy are being used to help the petroleum industry is in the control of oil-well acidizing. As most of you know, the rate of flow of an oil well depends among other factors on the porosity of the formation. This porosity is reduced with age as particles of limestone or dolomite are deposited in the interstices. When production drops to an uneconomical level, the well can be treated with 500 gal. to 3,000 gal. of 15 per cent hydrochloric acid, under pressures as high as 2,000 psi, to dissolve some of the calcium and magnesium carbonates and reestablish the flow. This process, called oil well acidizing, has been in use for the past 20 years. To avoid wasting most of the acid on non-producing limestone formations, it is necessary to control accurately the position of the acid in the well. The well is filled with oil, and the acid is introduced into the bottom of the well through a 2-in. tubing within the casing. The oil, being lighter than the acid is displaced upward into the annular space around the tubing. When the acid reaches the desired level, i.e., covering the suspected oil-bearing formation pressure is applied to the oil-filled annulus by a pump truck at the surface. This holds the acid-oil interface at the desired depth in the well. If the pressures exerted both by the acid pump truck and the oil pump truck are increased properly, the acid can be injected into the formation in a controlled, desirable manner. Numerous methods have been used in the past to establish the position of the acid-oil interface in the annular space, but most of these have not been very satis factory. Today a small quantity of radioactive iodine is added to the hydrochloric acid. The position of the acid-oil interface is controlled by the response of a Geiger counter lowered within the inner tubing to the desired level. The inner tube is filled with radioactive acid, which results in a rather high but steady background, and the meter then responds to the rise and fall of the acid-oil interface in the annular space between the 2-in. inner pipe and outer casing. By the use of the radioactive isotope method, it is not necessary to remove the inner tubing. The technique has been in routine use in the oil fields of Kansas and Oklahoma for more than two years. In at least one case, I understand, an abandoned field has been reactivated, and is being re-

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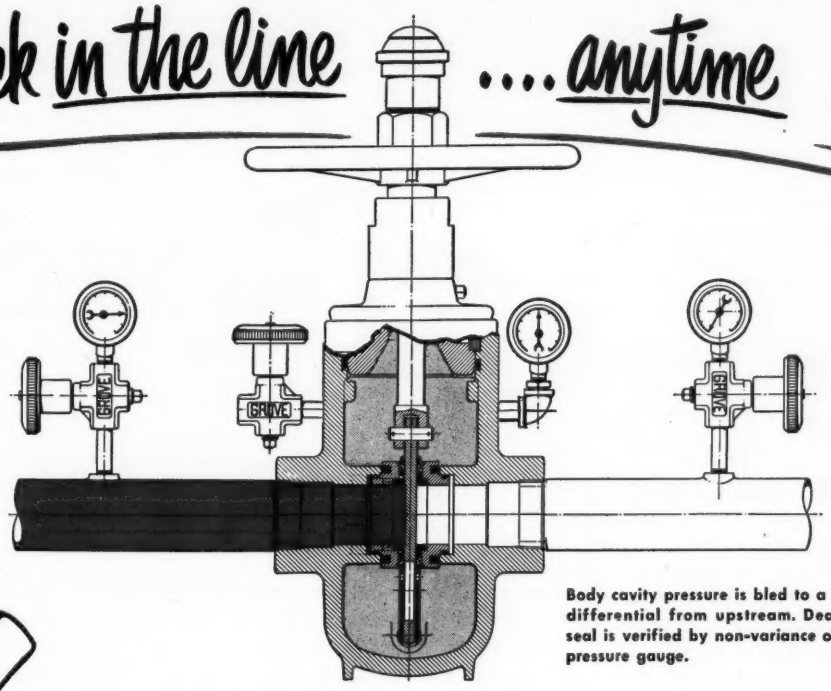

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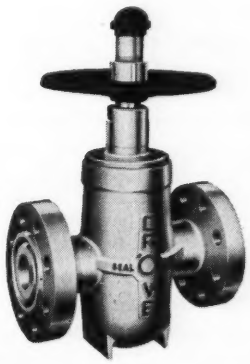

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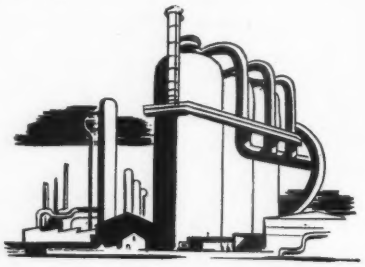
drilled as the result of information gained by this type of operation.

Pipe-Line Transportation

I am sure all of you in the Division of Transportation of the American Petroleum Institute are familiar with the use being made of radio active substances to mark the interface between two types of petroleum product flowing in a pipe line. Two main advantages are realized from this. First, the interface is located at the receiving station much more rapidly and accurately than before; and second, it simplifies enormously the complex task of pipe-line scheduling when a single pipe line is used to transport a dozen or more different products to be delivered to various customers. I have heard that in one pipe-line system extending 560 miles from Salt Lake City, Utah, to Pasco, Wash., each use of the radioactive marker technique has saved approximately 150 bbls. at a reprocess cost of $1,500. On this basis, it is stated, the cost of the measuring equipment was recovered in approximately one week of operation. It has also been found possible to use the gamma radiation from the marked interface to start and stop pumps automatically.

Radioactive Tracers

Another use of radioactive material associated with the petroleum industry and now considered classic is the measurement of wear and lubrication in a test engine containing radioactive piston rings. These piston rings are irradiated in a nuclear reactor, and thus some of the atoms in the iron become radioactive. The lubricating oil under test is added to the assembled engine, and the radioactivity of the oil is measured as the test proceeds. The engine need not be dismantled between measurements, and the same irradiated piston ring may be used in from 50 to 100 tests. The sensitivity of the method using a scintillation counter is such that significant measurements of wear can be determined after a running time of but 15 min. to 30 min. It is, therefore, possible to measure rapidly the effect of engine loads, speed, water-jacket temperature and, of course, variations in the lubricating efficiency of different oil formulations. One West Coast oil company has estimated the savings possible in carrying out a test program which normally would have cost $1,000,000 by conventional test methods and would have required 60 years' effort with the equipment available before the advent of radioactive tracers. This isotope technique was instrumental in obtaining the same information in 4 years, with the research budget totaling $35,000.



Still another place where radioactive tracers have been used to advantage is in measuring the circulation rate of catalyst beads in large petroleum catalytic crackers. For example, one oil refinery has tagged some of the catalyst beads with radio active zirconium-95 and measured the emitted gamma radiation through the walls of the reactor to obtain the circulation rates directly. One ring of Geiger counters is fastened around the top of the catalyst chamber, and a second ring around the bottom. When one of the radioactive beads passes the first ring of counters, the counter response is registered on a meter. When the same bead passes by the second ring, the meter is again actuated, and the elapsed time between these events is noted. From the elapsed time and the known weight of catalyst between the two rings, the circulation rate, in tons per hour, can be obtained quite simply. The equipment described is now in routine use in almost all of the Houdry plants operated by this particular company. In one outstanding case, in a Salt Lake City refinery, the cracking operations were producing off-specification gasoline. The radioistope method was brought in as an emergency measure, and was credited with removing the difficulty within 24 hours, saving replacement of 4 to 6 tons per day of catalyst at $300 per ton and averting a shutdown estimated to cost $100,000.

Also in the Refinery . . .

One of the important future methods by which solid hydrocarbons will be converted to liquid fuels is through the so-called Fischer-Tropsch synthesis. This, of course, involves the reaction of carbon monoxide and hydrogen in the presence of an iron catalyst to form, among other things, saturated hydrocarbons. The mechanism whereby hydrocarbons are produced from this reaction is not clearly understood. One theory suggested that this reaction might proceed by way of metal carbide formation with subsequent reduction of the carbide by hydrogen. To determine if this possibility might be correct, an experiment was carried out whereby some of the catalyst was initially converted to carbide utilizing carbon-14, a radioactive form of carbon. This carbide was then used as the catalyst for preparation of product hydrocarbons. The radioactivity of the resulting hydrocarbons was practically zero—indicating that very little, if any, of the reaction took place through an intermediate carbide step. While not explaining how the reaction does occur, this did eliminate one possibility.

And, Further, in Research . . .

Yet another use of an atomic energy technique was recently carried out in a research project which tended to show that petroleum is being created even today in the material being deposited on the ocean bottom. Only very slight concentrations of hydrocarbons were found in this muck, but nonetheless enough definitely to prove that such were present. Of course, a "doubting Thomas" could always maintain that this small amount of hydrocarbon could have diffused from oil pools far below the ocean bottom, and thus not correspond to new oil, but to conventional petroleum, produced eons ago. To test this hypothesis, some of the "new" oil was examined by a very sensitive counting technique developed by Dr. Libby at the University of Chicago to determine the age of specimens by their content of carbon-14. All living matter contains traces of carbon-14 made by the cosmic-ray bombardment of nitrogen in the air. Ordinary petroleum which has been out of contact with living matter for many thousands of years shows practically no carbon-14 activity, since any present has long since decayed. However, this "new" oil

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turned out to have considerable carbon-14 activity present, thereby proving that it originated in comparatively modern times.

In the Cause of Peace

The fact that the petroleum business has discovered such varied uses for the byproducts of atomic energy is most pleasing to those of us interested in promoting the peacetime atom. We feel that this points up the kind of worthy assistance the secondary products of atomic fission can offer numerous other industries, provided sufficient attention is given the matter. It also serves as possible evidence that the petroleum industry—even for all of its 94 summers—is a keen, alert, fast-on-its-feet organization, eager and ready to take advantage of whatever new techniques basic science brings to the fore. This means that the petroleum industry should prove a worthy adversary in those areas where atomic energy will offer a challenge.

A Possibility

In spite of my earlier statement that our two fields will not be generally competitive, there are several areas where competition to some extent seems inevitable. Even though atomic energy will probably not render obsolete any present equipment energized by fossil fuels, there are three categories where it is within the realm of possibility that future units may find atomic fuel more economical than a petroleum product. These include:

a. Oil- or gas-fired boilers for process heat or electric power production (=100,000-kw capacity or more).

b. Diesel-powered electric plants (5,000-kw to 25,000-kw capacity).

c. Large prime movers (ships, large aircraft).

This Is All Yours

Because of "critical-size" considerations and shielding requirements, it is a fairly safe assumption that atomic energy will not compete with petroleum as fuel in the packaged-power field covered by units of 1-hp to 1,000-hp equivalent. This means that automobiles, trucks, tractors, small naval craft, most aircraft—and probably even locomotives—as well as home-heating units, are not economically feasible with atomic energy. And of course, by the very nature of things, you petroleum folks have no cause to fear that atomic energy can preempt any of the growing petrochemical field. Consequently, it is clear that a goodly percentage of your present outlets for petroleum products will remain unchallenged, irrespective of what striking advances occur in nuclear science and technology. Even the areas of possible competition which I staked out above are at best academic in character today, and will require years of experimentation and experience before materializing into concrete threats. It is to be noted, however, that methods of transportation are within, as well as beyond, these areas; and, for this reason, progress in the industrial development of atomic energy should be of considerable interest to you. Let us analyze how each of the three categories stacks up at the present time.

ATOMIC POTENTIAL

1. Central-Station Power Plants

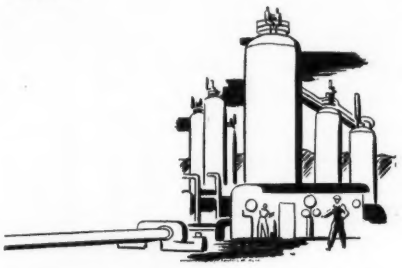
Coal is the predominant fuel for most large central-station thermal electric plants in the United States today. However, in a few regions—notably the Southwest and the Far West—natural gas and fuel oil are employed. The average cost of a kilowatt-hour of electricity generated in large U. S. power plants is about 7 mills. The fuel costs a little more than 3 mills; fixed charges, i.e., cost of money for capitalization of plant, depreciation, taxes, profit, and insurance, account for a little less than 3 mills; and operation and maintenance average 1 mill. The President's Materials Policy Commission, in its report submitted last year, indicated that adequate supplies of fossil fuel would be available to provide all U. S. electric power requirements for the next 25 years, and at real costs not substantially greater than exists today. Consequently, if large nuclear power plants are to gain a foothold in our country during the next 2½ decades, they must generate electric energy at a cost not exceeding the 7-mill figure. Can this be done?

To answer this query, we must first acknowledge that nuclear power plants will look and function very much like conventional power plants, the major difference being that the boiler and coal-handling facilities of the conventional station would be replaced by a nuclear reactor and accompanying heat exchanger. As yet we know of no practical method for converting fission energy directly into electric energy. To a degree, this helps define the problem because we can then get a line on the situation by determining what one could afford to pay for the reactor and nuclear fuel in order that the total cost of power be 7 mills per kilowatt-hour. The government has not yet set a price on natural-uranium fuel rods for power reactors, but a figure which is deemed reasonable by a number of people who have speculated on this subject is $35 per pound. If we assume that, as a practical matter in a converter-type solid-fuel reactor, 1 per cent of the uranium atoms present can be split before the buildup of fission products and radiation damage require that the fuel rods be removed from the reactor and thrown away the resulting fuel cost turns out to be 1.3 mills per kilowatt-hour. It might seem that we are being profligate in suggesting that the spent fuel rods be thrown out when they still contain roughly 99 per cent of the uranium charged. However, in view of the intense radioactivity of the fission products present, and the reduced content of fissionable atoms in the rods, it appears that the cost of recovery of uranium by present processing methods would be greater than simply purchasing new fuel rods. Perhaps the term "throw away" is an unfortunate choice of words here because the spent fuel can be stored for later recovery if and when the economics of the situation warrant such action. This, of course, ignores possible credits for the fission products or a premium price for the contained plutonium, but it is not clear that either of these products merits serious consideration at the moment. Thus far the outlook for nuclear power seems favorable, inasmuch as we are saving roughly 2 mills per kilowatt-hour in fuel cost. However, this optimism fades when we start looking at the relative costs per installed kilowatt of a coal-fired steam boiler and a reactor plus heat exchanger. The cost of the former ranges from $80 to $100. We have no comparable figures on power reactors, since no large central-station nuclear

power plant has ever been built; but published "guesstimates" of the latter have been in the neighborhood of $500 per kilowatt. If we capitalize our 2-mill fuel savings—assuming 13½ per cent fixed charges, and that the plant operates 7,000 hours annually—we find we can tolerate spending an extra $100 per kilowatt on the reactor, or a total of roughly $200. When this is compared with the $500 guesstimate, it seems clear that nuclear power is not competitive today if the above assumptions are valid. Obviously, the situation is not really this clean-cut. Perhaps a reactor can be built for less than $500 per installed kilowatt even today; maybe a more realistic price for uranium fuel elements is $20 per pound instead of $35. Perhaps one could run to 2 per cent burnup instead of 1 per cent. Maybe there will be a market for packaged fission products, or a premium price might be offered for plutonium beyond its ordinary fuel value. These and other imponderables cause us to be hopeful that one day nuclear power will be able to stand on its own feet, but this day is evidently somewhere in the future.

2. Package Power Units

There are a number of locations, even in continental United States, which are remote from supplies of conventional fuels and yet do have modest electric power requirements. When the power need is in the 5,000-kw to 25,000-kw range, it is most conveniently supplied today with Diesel units, and the generating costs may run as high as 15 mills per kilowatt-hour, depending on the transportation costs for the fuel. Owing to the essentially weightless character of nuclear fuel, one **pound** of fissionable material possessing the heat equivalent of thirteen hundred **tons** of coal, considerable thought has been given to the possibility of developing a package nuclear power plant which might more readily prove competitive with small remotely located conventional plants than with big domestic central-station facility. Studies on paper indicate that a nuclear power plant would come close to hitting the target here, but the uncertainties are sufficiently great that no responsible private group has evidenced serious interest in tackling a project of this nature with its own money. Were the government to finance a prototype unit of this size which showed power costs even marginally economic, it is felt that a number of industrial groups would then be willing to follow up with subsequent units entirely financed by private capital.



3. Nuclear Power for Propulsion

From a technical standpoint, it would seem far more difficult to perfect nuclear energy for the propulsion of vehicles and vessels than for the generation of central-station electric power. However, the cold-war urgency that our nation possess superior military might, and the accompanying relaxation of strict economic requirements as gaged by commerical standards for military prime movers, has enabled us to carry mobile reactor development to a more advanced state than the central-station analogue. In fact, the STR* prototype unit has been operated successfully at the National Reactor Testing Station in Idaho, and it is fully expected that a nuclear-powered submarine will be plying the high seas some time next year. It has recently been announced that the "Nautilus" will be launched next January. The incongruity of this seeming paradox, wherein by joint AEC-Navy effort our nation has accomplished the hard task of building a compact power unit and yet still cannot see our way clear to tackling the seemingly easier job of building a central-station plant, can be rationalized from overriding military needs and by reference to the relative economics of the two applications. The average power costs in a fleet submarine have been estimated by the U. S. Navy at some 8 cents per kilowatt-hour, an order of magnitude greater than that which would be considered justified for a large land-based commercial power plant. Beyond this, a super-speed chemically-powered submarine has power costs another order of magnitude greater—approximating $1.00 per kilowatt-hour. Thus it is clear that, in this unique area, nuclear power offers great promise both from the standpoint of lower cost and premium performance. Still I think it would be erroneous to conclude that, just because atomic submarines are practical, economic nuclear-powered tankers and merchant vessels are on the near horizon. On the other hand, the success of the nuclear submarine program reinforces our confidence in the technical practicality of mobile nuclear power plants, and represents the first milestone in an approach to commercial vessels powered with nuclear fuel.

At one time the U. S. Navy and the Atomic Energy Commission were pursuing a project for the nuclear propulsion of a large surface vessel, such as an aircraft carrier. Last spring a redetermination by the Department of Defense caused this military equipment to be withdrawn. However, in the course of the session just concluded, Congress authorized the expenditure of $7,000,000 for the initiation of construction on reactors which will contribute technical knowledge both to central-station power and the propulsion of naval vessels. Therefore, it may be expected that future work bearing on the development of mobile reactors for surface ships will continue, although at a reduced pace.

What does all this augur for you, who are concerned both with the transportation of petroleum in tankers and with the use of fuel oil by the U. S. Navy and the U. S. Merchant Marine? In the same vein as the restaurant owner who hung a sign on the door each noon "OUT TO LUNCH," will your tankers one day employ nuclear fuel to transport hydrocarbon fuel, or is this idea preposterous? At the moment nobody has the final answer. Preoccupation of the Atomic Energy Commission with the pressing problem of assuring the common defense and security has prevented anything other than the briefest look at this possibility. It of interest that a joint paper study of merchant-vessel propulsion by nuclear power is currently being initiated by the Atomic Energy Commission and the U. S. Maritime Commission.

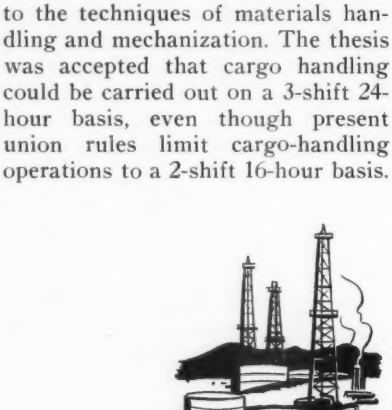
To date the only serious treatment of this general problem which has come to my attention is that carried out in 1951 by a group of Harvard Business School students under the direction of Professor Georges Doriot. This study appears in a chapter in the mimeographed publication, "Swords into Plowshares." They considered the feasibility of nuclear propulsion for dry-cargo vessels in the North Atlantic trade. In view of the expected higher capital cost for a reactor system as compared to an oil-burning unit, it was decided at the outset that only for a really high-speed vessel (=35 knots) would nuclear power be at all justified. This, in turn, demands a structurally stronger hull and twin screws, which make the basic nuclear ship considerably more costly than a conventional vessel of the same cargo capacity, even aside from the propulsion unit. Their basic analysis consisted in comparing, on an annual basis, the operation of a 20-knot C-4 "Mariner-class" dry-cargo vessel and a hypothetical nuclear-powered craft of equivalent cargo capacity boasting a 35-knot speed. With this choice of equipment, a determination was attempted of the funds which a commercial ship operator could afford to invest in a nuclear-powered ship to realize the same percentage return on his investment as the "Mariner" would yield. The premise was that, given this equivalent return and the attendant advantages of higher speed, the choice would go to the nuclear ship.

Several important assumptions underlie the findings of this study:

1. It was assumed that, while the rated cruising speeds of the "Mariner" and nuclear ship were, respectively, 20 knots and 35 knots, adverse weather and harbor approaches would reduce their projected annual averages to 17 knots and 32 knots respectively.

2. The assumption was also made that a nuclear ship will never be built without reasonable assurance of a volume of trade required to support it. Thus a hypothetical load factor of 95 per cent, somewhat above the stated break-even point for current operating experience, was chosen for the nuclear-powered vessel.

3. The additional assumption was made that cargo-handling time can be significantly reduced in the future as more attention is directed to the techniques of materials handling and mechanization. The thesis was accepted that cargo handling could be carried out on a 3-shift 24-hour basis, even though present union rules limit cargo-handling operations to a 2-shift 16-hour basis.



4. The Harvard group further adopted the view that premium rates will be justified for freight carried at a higher speed. Justification for this is found in the higher rates secured for air freight. Purely on the basis of the relative speed involved, they chose a 20 per cent to 50 per cent premium over the conventional ocean rate for the particular route selected.

5. They believe that, in addition to the investment in the ship, an additional $5,000,000 is required for working capital and other facilities in both cases. This makes the total investment in a "Mariner" $13,500,000, as compared to a total of $19,000,000 plus the reactor and fuel inventory costs which can be assigned to the nuclear ship.

6. Finally, they concluded that no charge need be made for fuel consumption that in the nuclear ship, because calculations suggested that such costs may be so low as to be negligible.

Two extreme cases were considered—one involving optimistic estimates, the other based on the more conservative appraisals. In case I, cargo handling was assured to be at the best attainable rate for general dry cargo on the basis of a 24-hour working day and a reduction in handling time by one-third as a result of increased mechanization. The highest possible premium for increased speed was assumed to be 50 per cent above the conventional trans-Atlantic ocean-trade rates. In the pessimistic case, cargo handling was still assumed to be on a 24-hour basis, but no reduction in handling time due to mechanization was allowed. Further, only a 20 per cent premium for increased speed was taken here.

Under the foregoing hypotheses and assumptions, the following conclusions were reached as a result of the study:

1. A 35-knot nuclear ship of approximately 25,000 tons gross weight will when the cost of mobile reactors declines to levels between $4 million to $15 million, still represents a total investment between $25 million and $35 million. This figure is 2 to 3 times that required for a 20-knot "Mariner" of the same cargo capacity.

2. The useful work performed by any ship is strictly limited by the time spent in handling cargo into and out of the hold. Without continuous 24-hour loading and unloading, the value of increased speed will be negligible. Even assuming continuous cargo handling on a 24-hour basis and conventional stevedoring, a 35-knot ship will annually move only 33 per cent more cargo than the 20-knot "Mariner." Assuming a one-third increase in handling capacity from mechanization, a 35-knot ship will achieve only 40 per cent more tonnage than the 20-knot ship. Hence, at comparable freight rates, the increased utilization resulting in a 40 per cent greater annual tonnage carried by virtue of the speed advantage will not in itself justify the investment in a nuclear ship. Of course, had consideration been given to liquid cargoes which can be unloaded in shorter times, the value of the increased speed would be definitely enhanced. Consequently it is clear that, had oil tankers been chosen for study, different conclusions might have resulted.

3. Justification for the dry-cargo nuclear ship and for speed in excess of that obtainable in the "Mariner" will depend heavily upon the availability of premium freight rates for the increased speed. Since cargo-handling time is the same in both

cases, even with the time at sea for the nuclear ship only a little more than half that of the "Mariner," the net time saving to the customer is not great. Yet, on the assumptions made in this trans-Atlantic example, the results suggest that the premium for extra speed might have to be 40 to 50 per cent over conventional ocean freight rates. They, therefore, conclude that a sizable premium must be forthcoming, and that there is some reason to doubt that the shipper or customer would be willing to pay that premium.

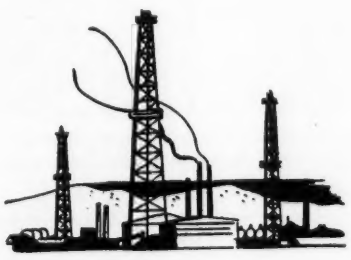
4. The concept that larger ships and greater cargo capacities might permit further gains from a 35-knot speed is false. Although the prospects of a large increase in horsepower with relatively insignificant increase in the size of reactors strongly suggest the possibilities of larger ships again it is cargo-handling time which governs. Thus doubling the size of the ship increases annual cargo capacity by only 20 to 30 per cent, with the other stipulations as cited above. They therefore, conclude that, if anything, nuclear ships will be somewhat smaller than the one patterned after the "Mariner."

In view of the preceding, one arrives at the general conclusion that the probability of extensive use of nuclear power for high-speed surface merchant vessels in the near future is extremely nebulous. It might well be possible, however, to justify the use of such ships to a very limited degree on heavily traveled trade routes wherein particular commodities require the additional speed and will support premium rates.

A possible criticism of the study might be made on the grounds that it was unwise to select an example wherein the premium-speed factor would be largely offset by the hold-up time in loading and unloading. As mentioned earlier, a tanker study might show results considerably more promising. On the other hand, it would be hard to rationalize any premium rate for the speedy delivery of a petroleum shipment so that the ultimate advantage of a nuclear tanker would depend on its greater annual tonnage. Even assuming zero turn-around time for tanker operation, the nuclear vessel considered above would hardly double the annual tonnage carried by a "Mariner" tanker. Thus we would still be able to invest only about $4,000,000 in reactor and fuel to compete on an even basis. More promising results might be expected from a study of passenger vessel traffic, where time is an important factor. Still I feel this study rendered a valuable service as the first serious approach to the question of nuclear power for merchant vessels. It is also rather encouraging to note that, of a $15,000,000 investment in reactor and fuel inventory were permissible this would correspond to an installed kilowatt cost of roughly $300. While this is far below the $1,400 per kilowatt cost estimated for the first nuclear submarine, it does not appear to represent a completely unattainable goal at some future time, in view of the possible advances which can be expected in the technology of mobile reactor systems. I feel the ultimate promise of nuclear power for the propulsion of merchant vessels is sufficiently bright that you will wish to acquaint yourselves with such information as can be made publicly available from time to time within the bounds of security restrictions.

Policy Problems Surmountable

My previous remarks on the possible commercial use of nuclear power units were devoted exclusively to the pertinent technical and economic factors. There is also the policy, or better phrased, the legal aspect to be pondered. Today it is academic to talk of commercial nuclear power. By law, the Atomic Energy Commission has a monopoly on the ownership of facilities for producing fissionable material, as well as fissionable material itself. Most people agree that this monopoly must be relinquished before sizable amounts of private capital will begin to flow into nuclear power development. The Atomic Energy Commission believes this to be so, and is further convinced that it is now appropriate to modify the atomic energy act to promote industrial interest and participation in this activity. At the request of the Joint Committee of Congress on Atomic Energy, the commission last spring formulated and submitted to the joint committee a statement of policy which, if accepted by the Congress would serve as a basis for enabling legislation. During June and July just past the joint committee held a series of open hearings on the subject of atomic power development and private enterprise, in the course of which more than 100 witnesses offered testimony. It is impossible here to summarize the various viewpoints introduced at the hearings. Suffice it to say that a wide spectrum of opinions was voiced—so much so as to make it apparent that additional thought must be devoted to the problem by the legislators before deciding on a proper course of action. The 649-page volume, **Atomic Power Development and Private Enterprise,** detailing all contributions, is obtainable from the Government Printing Office (price $1.25). This is "must" reading for anyone who is seriously interested in the future of nuclear power.



I firmly believe the acknowledged policy difficulties to be surmounted in this area should not deter us in our quest for an equitable solution. Continued U. S. preeminence in nuclear science and technology is at stake here. The prodigious quantities of energy available from the splitting atom demand that its constructive promise be not ignored, just as the leading world powers have not dared to ignore its capacity for destruction. The policy problems, as opposed to the technical questions, are creations of man. Granted sincerity and a willingness to subdue personal prejudices, they can be solved by man.

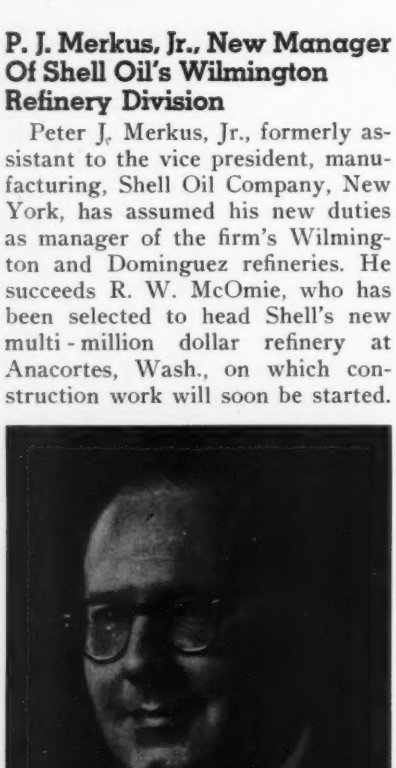
This paper was presented at A.P.I.'s Annual Meeting.

* STR—Submarine thermal reactor

Personalities IN THE NEWS

P. J. Merkus, Jr., New Manager Of Shell Oil's Wilmington Refinery Division

Peter J. Merkus, Jr., formerly assistant to the vice president, manufacturing, Shell Oil Company, New York, has assumed his new duties as manager of the firm's Wilmington and Dominguez refineries. He succeeds R. W. McOmie, who has been selected to head Shell's new multi-million dollar refinery at Anacortes, Wash., on which construction work will soon be started.



P. J. Merkus, Jr.

Mr. Merkus joined Shell in 1934 as a technologist in St. Louis after receiving his Doctorate in Chemical Engineering from the University of Michigan.

With the exception of a year at The Hague, Holland, he worked in the St. Louis office until 1939, when he was transferred to Norco, La., refinery as chief technologist. In 1940 he moved to New York as assistant manager, manufacturing, research and development, to be named manager three years later. Mr. Merkus was subsequently appointed assistant to the vice president in 1946, a post he held until his recent assignment.

Mr. and Mrs. Merkus, together with their two children, will make their home in Long Beach.

President Tyler F. Woodward of Southern California Petroleum Corporation plans to return to Los Angeles early in March. Due to the increasing interest in his company's operations in combination with International Egyptian Oil Company in Egypt, he somewhat delayed his departure from the "Land of the Pharoahs."

Stanffer Chemical Company, a well-known petroleum industry supplier of chemicals, added four new members to its 25 year club at an annual award dinner. They were Charles Toretta, William Reichart, Loyal Smith and Elsie Reinhard.

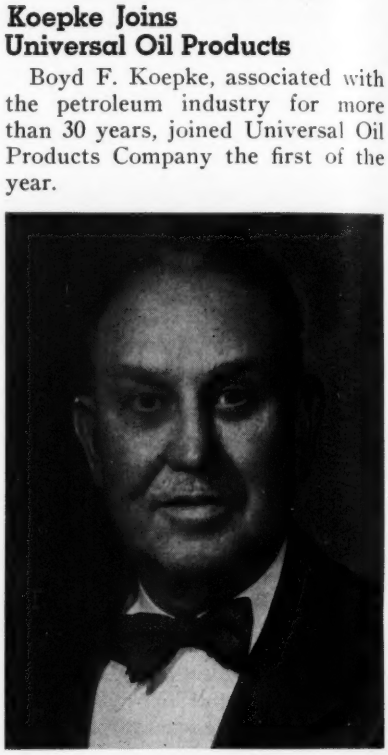
Jack and Martin Mud Service is the name of a new company engaged in the oil well drilling fluids and chemical business at 4251 Faculty avenue in Long Beach. The company is owned by Jack Marquette and Martin Vignovich.

A $20,000 three-dimensional model of the Cuyama Valley field was presented to the University of California at Los Angeles by President Charles S. Jones of Richfield Oil Corporation to UCLA Chancellor Raymond B. Allen. The model will be used in the teaching of geology. Others at the ceremonies were Frank A. Morgan, Richfield vice president in charge of exploration, and Rollin Eckis, Richfield chief geologist.

Mae Hampton and Mattie Peal of Fillmore, Ventura County's oldest twins, were among residents leasing their land where they live as a result of the oil boom fanning out in Santa Clara Valley. The twins are 88.

Koepke Joins Universal Oil Products

Boyd F. Koepke, associated with the petroleum industry for more than 30 years, joined Universal Oil Products Company the first of the year.



Boyd F. Koepke

Koepke, who was engaged in technical sales work in the petroleum field for the Aluminum Company of America for the last eight years, will be UOP sales representative to refiners and manufacturers of natural gasoline in Midcontinent and Gulf Coast areas.

He is a graduate of the University of Oklahoma, where he received the degree of Bachelor of Science in Petroleum Chemistry in 1921.

R. O. Turner, manager of Camay Drilling Company, has just announced the promotion of Hugh M. Gallagher to assistant manager in charge of drilling contracts and contractual relations, while R. L. (Whitey) King has been moved up to the post of assistant drilling superintendent under the supervision of W. J. Carlton, superintendent.

BS&B Holds General Sales Meeting

Approximately two hundred and twenty-five sales personnel attended the general sales meeting held by Black, Sivalls & Bryson, Inc., January 22 and 23, at Kansas City, Missouri. All of BS&B's fifty-four sales offices and branches, plants and its Canadian subsidiary, were represented at the meeting.

Opening on Friday morning with a conducted tour of BS&B's Kansas City plant, the group observed the manufacturing operations involved in the production of bolted steel tanks, oil and gas separators, and indirect heaters, gas dehydrators, safety heads, vent valves, propane systems, grain bins and foundry flasks.

The meeting was formally opened at a luncheon at the Hotel President, with Henry A. Ruysser, Jr., Vice President and General Manager of Sales, delivering the key opening address. Mr. Ruysser pointed out that each BS&B sales division had shown an increase in sales in 1953, and that company-wide sales had increased 38 per cent over 1952 sales. He outlined the sales forecasts for 1954, calling for a continued increase in sales volume.

Separate divisional meetings took place during Friday afternoon and on Saturday. Each division heard talks by key sales, engineering, manufacturing, sales training and advertising personnel. Panel discussions of marketing opportunities and selling problems were conducted by District Sales Managers.

The concluding banquet on Saturday night featured an address by Kenneth W. Lineberry, BS&B President. Mr. Lineberry pointed out the qualities that distinguish a BS&B salesman and expressed the opinion that the selling profession is "the greatest of them all."

A highlight of the banquet was the awarding, by Mr. Lineberry, of diamond-studded service pins to field sales personnel. Thirty-five year pins were presented to William Connor, Casper; Sam Driver, Drumright; and John E. Humphrey, Sr., Seminole. Hal B. Fessler, Sr., Oklahoma City, was awarded a thirty-year pin. Twenty-year awards went to Lee Kelton, Casper; Glenn Parmlee, Houston; and Wilson Deardorff, Tulsa.

Fifteen year pins were awarded to Walter Slay, Lubbock; L. E. Jones, Alice; Thomas E. Pool, Abilene; and Emery Allee, Oklahoma City. Ten year pins went to John T. Cross, Hobbs; William McGinnis, Houston; John E. Walker, Tulsa; and William Watkins, Kilgore. The following received five year pins: Golden Averett, Graham; Glenn Bradford, Lafayette; Frederick O'Rourke, Corpus Christi; Rex Vicars, Alice; and Otis Waguespack, New Orleans.

The BS&B Canadian group received several service awards, a twenty year pin going to George Smale, a fifteen year pin to Bob Conn, a fifteen year pin to Paul Bartley and a five year pin to Delbert Smith, all of Edmonton, Alberta.

Black, Sivalls & Bryson, Inc., founded over sixty years ago, are manufacturers of oil and gas field processing and storage equipment, "Climax" automatic controls, safety heads and other steel products. General headquarters are at Kansas City with major plants located at Kansas City, Oklahoma City and Tulsa.

Thos. M. Blake, widely known independent operator, reports acquisition of a wide spread of prospective producing ground in the Tampico area of old Mexico. Blake also made known that he is planning a deep test well on an 8000-acre lease in Lincoln County, Wyo., 25 miles southwest of Big Piney. His main office is in the Subway Terminal Building, Los Angeles.

Concluding banquet of BS&B's General Sales Meeting, Hotel President, Kansas City, January 23. About two hundred and fifty were in attendance. At the speaker's table, left to right: M. G. Purpus, Sales Mgr., Special Products; Jimmy Dvoracek, Sales Manager, Controls-Safety Heads-Vent Valves; James J. Stratton; Secretary; Charles H. Myers, Vice President; W. A. Oberholtzer, Treasurer; Kenneth W. Lineberry, President; Henry A. Ruysser, Vice President and master of ceremonies; Abe Yeddis, Vice President; Max Kunert, Vice President; Chester A. Siver, Vice President; Floyd Myers, Manager, Oilfield Sales and service; and Bill Williams, Director of Sales Training.

Republic Supply Shares Management Information With Employees

Republic Supply Company of California finds that employees function more like a winning team when they know the company goals and the current score. President John J. Pike follows accordingly a regular policy of sharing financial and management information with worker personnel.

Yearly, as soon as the firm's annual report is available, he sits down with groups of employees from the company's statewide organization and explains to them the financial statement and the facts of management strategy. Questionnairies are issued in advance so that employees may prepare questions as to policy, future plans and current results. Questions may be anonymous if desired. The result has been a high degree of understanding and mutual confidence between the management and the other employees, and with closer cooperation for better service.

"I am well aware," Mr. Pike states, "that up to a few years ago, it was not generally considered either necessary or wise to share financial information or discuss policy with the bulk of the personnel in business organizations. Communication between the two was usually a one-way street. This was particularly true in larger organizations where personal contact between the two divisions was less practical than in smaller ones.

Today, scientific management has somewhat altered that concept. Careful thought and investigation by specialists in industrial relations has shown that interchange of information between management and worker personnel has definite value from the standpoint both of production and morale. The operation of the business then becomes like a game with the home team playing. Interest is multiplied when objectives and score are known."

At Republic Supply Company, the Management realizes that the security of 500 employees depends upon the success of the firm as a whole. When the employee realizes it, he naturally cooperates better in the measure that he understands the problems which must be worked out with his aid.

John J. Pike

Every employee receives a copy of the yearly financial statement, and during the information sessions, Mr. Pike explains and discusses each item by means of transparencies reflected on a screen. Questions posed cover a wide range from items like a request to explain "depreciation" and analysis of expense items, to plans and prospects for the current year.

The personnel management of the firm states that the practice of sharing information in this intimate way has had a definite effect in reducing employee turnover.

The Management as a whole agrees that it is sound business policy.

Paul K. Fraser has been promoted to the position of field salesman with headquarters at Ventura, according to H. W. Robinson, Bethlehem's General Manager of Stores.

Transferred to Ventura in 1948, Fraser first hopped counter; later was appointed Assistant Store Manager. Under the direction of C. L. Guttery, Ventura Manager, he will serve customers in the Ventura and adjacent Coastal area.

Transferred from Castaic to assume the duties of Ventura Assistant Store Manager is Warren McLeod. A former oil company roughneck in the Ventura field, he is no newcomer to the area and hopes to renew many old acquaintances.

Danielson Joins Hill & Christopher Advertising

Robert E. Danielson has joined the Hill & Christopher agency, Los Angeles, for account and copy work on the Halliburton Oil Well Cement Company account. Danielson, former vice-president of Western Press, Inc., St. Louis, recently returned from the Far East where he served with an Army intelligence unit.

He succeeds William R. Graydon who has been appointed West Coast Editor of a petroleum magazine.

Arthur C. Fisher, Los Angeles independent operator, has made known that he is obtaining bids from drilling contractors for the deepening of his test well on Section 10-29s-22e in the South Belridge area of Kern County. Tentative plans call for taking the project on down to the Etchegoin formation. The operator also announced that he has granted Seaboard Oil Company the deep rights below 6000 feet on Section 10 and on adjoining sections under lease to him.

American Association of Oilwell Drilling Contractors has voted $30,000 for carrying on a research program for a year. If more than one year is required to complete the studies another $30,000 will be made available, the association reported. The program, designed to study methods of increasing the penetration in oil and gas well drilling operations, was unanimously approved by the AADC board of directors.

Los Angeles headquarters of the Rocky Mountain Drilling Company have been moved to 611 Wilshire boulevard.

Newton Drilling Company has a contract rig working on Marshall Brown's Montana No. 1 wildcat test in the Marysville area, Sutter County.

Before genial Ham Bell returned to the City of the Angels from a meeting of drilling contractors in Dallas, he hit the trail south of the border in a short junket in the tequila, guitar and siesta country deep in old Mexico.

American Pipe & Steel Corp. Marks 50th Anniversary

The American Pipe & Steel Corporation, one of the oldest independent steel fabricators on the West Coast was founded at its present location in December of 1903. American is a recognized leader in the manufacture and sale of oil field production equipment, L. P. Gas systems, liquid fuel transportation and distribution equipment, special vehicles and aircraft fueling systems. Through its production facilities and Research and Development Division the company has made valuable contributions to the national defense program.

Jack Lane, Pres., congratulates Earl Kelly who has been with the company forty-three and a half years. Others are L. to R. Tom Tily, Bob Tily and Russel Rawson all with over forty years service. With Jack Lane who joined the company twenty-five years ago, this group represents 193 years of service with the American Pipe and Steel Corporation.

The fiftieth anniversary of the organization was celebrated on December 16, 1953 with a dinner at the Alhambra Elks Club. Sixty people attended, including company officers, department heads and all employees with 10 years or more of service.

In commemoration of the event, Jack Lane, president of the company, awarded gold watches to the five employees who held the longest service records, each of them over forty years. Mr. Lane also presented ten and twenty year service buttons.

Oilman J. Paul Getty has given to the Los Angeles County Museum, Rembrandt's fine portrait painting of Marten Looten, dated January 11, 1632. The work has been exhibited on loan at the museum for many years.

Chadwick Made Assistant Purchasing Agent of Tide Water

Archie H. J. Chadwick of Walnut Creek, California, has been promoted to Assistant Purchasing Agent of Tide Water Associated Oil's Western Division effective February 15, it was announced by Lloyd F. Bayer, Vice President and Chairman of the Company's Western Operating Committee.

Chadwick succeeds Alfred Urry of San Francisco, who is retiring after more than 40 years of service with Tide Water Associated Oil Company. The new Assistant Purchasing Agent will make his headquarters in San Francisco and report directly to George M. Dixon, who became the Company's Western Purchasing Agent on February 15.

Art Fisher, attorney and independent operator, has named his new thoroughbred racing stable "Lucky Acres Farm." The first letter of each word is relevant to initials of his daughter's name—Linda Arlene Fisher.

The many friends of Joseph Jefferson Davis Sr. were saddened by his recent passing at his San Marino home. President of Davis Investment Company of Los Angeles, he was born in Ottawa, Canada, and had lived in Southern California since his boyhood. Before entering the oil business, he was a realtor in the Santa Monica area and prominent in development of the original Santa Monica palisades through his association with the Santa Monica Land and Water Company. He was one of the first developers of the Signal Hill field. He also conducted extensive drilling operations in Texas and Oklahoma.

For the first time the Canadian-owned British American Oil Company Limited has held a directors' meeting in the United States. It was held recently in Dallas, Tex., with President Ole Berg, Jr., a native of San Francisco, among those in attendance. Head offices of British American are in Toronto, Canada. A subsidiary, British American Oil Producing Company, is operating in fields in California and 12 other states in the United States. Berg before joining BA years ago was with Union Oil Company of California.

Eastman Moves To New Location in Bakersfield

The First of February Eastman Oil Well Survey Company moved their offices in Bakersfield to a new building at 3504 Pierce Road. The company's offices were formerly at 216 Golden State Avenue.

Clyde Stokenbury, district manager at Bakersfield stated the new location affords more space and better parking facilities for Eastman's operations in the valley city. The new quarters, situated on more than an acre of ground, include general office space with five private offices, a reception room, instrument and tool storage shop, and a large photographic dark room. Adjoining this building is a garage connected to the main building with a breeze way.

At the rear of the property a new whipstock rack has been built and it is so arranged that trucks can drive completely around the rack for loading or unloading. A large paved parking area surrounds the office building.

Personnel at the Bakersfield office includes: Bill Lingo, assistant to the district manager; Arthur Selinger, salesman, Warren Brackett, Kelly Zeimer and M. O. Morris, senior field engineers, and Jack Bevan and Fred McElwee, junior field engineers.

The Eastman Company has maintained an office in Bakersfield for over twenty years. The Pacific Coast Division Office is at Long Beach.

AIME Junior Group Minutes of Meeting February 11, 1954

Mr. Bob Pearce of the Signal Oil and Gas Company gave an interesting history of **The Oil Industry in Germany,** a portion of which he had witnessed in 1951 and 1952 while stationed with the U. S. occupational forces. Slides were shown to illustrate operations in the two principal producting areas: Hanover and Emsland.

Germany's first discovery was near Hanover, in 1874. Includes the discovery well, which still produces, 308 wells are now producing 540 B/D of 18-27 gravity oil from the Cretaceous at 300 to 1000 feet. About 17,000,000 barrels have been produced.

Production is also obtained from mines near Hanover. Vertical shafts are dug to the 300 foot level, where oil sand is mined along horizontal beds, removed by rail and elevator, and finally "steam cleaned" at the surface. Recoveries of 1 barrel per ton (about 2000 barrels per acre-foot) are obtained in this way. Before a mine is abandoned, all cleaned sand is transported back to the mine to prevent future subsidence.

In the Emsland area, which is on the Dutch border west of Hanover, it was not until 1938 that oil was discovered. Soon afterward Germany was at war, heightening the need for oil, and Emsland oil development skyrocketed. However, canals were the only available means of transportation, and by the end of the war, great stores of oil were left at the docks.

By 1947 the U. S. allocated money for reviving the German oil industry, and since then additional production, transportation, and refining capacity has been added.

Germany's total yearly production amounts to about 12,800,000 barrels at the present time, of which 42 per cent comes from the Emsland area. The present 268,000,000 barrel proven reserve is expected to continue its accelerated rise, due principally to development along the Dutch border.

Germany now is able to refine about twice their productive capacity, but consumption exceeds their production by nearly 3 times. Therefore, in spite of present strides in oil development, it may be some time before the German oil industry can supply its own needs.

During the remainder of the meeting, a series of brief talks were given on recent activities of the major oil companies.

Mr. David K. Hayward of The Texas Company gave a review of drilling and operating problems in the newly discovered Del Amo and Olive fields. Early difficulties with lost circulation were overcome by running more surface pipe and by a particular program of mud control. Gravel packs and heater-treaters have answered certain production problems.

Mr. Floyd Schoonover of the Monterey Oil Company spoke of his company's offshore activities at Seal Beach and West Newport Beach. In each area, a discovery well has been completed. At West Newport Beach, where the second well is now being drilled, "frogmen" equipped with aqua lungs have been doing geologic "surface" mapping at 150-200 foot depths, along the ocean floor. The next well at Seal Beach is due to be spudded about April 1st, and is to be a straight hole from the steel and concrete drilling island, which is 75 feet in diameter and is located 8000 feet offshore.

Mr. Max Taves of the Richfield Oil Corporation drew a cross-section though the Wheeler Ridge oil field and located the newly discovered Eocene pool, below and to the north of the thrust fault. Formerly, principal production had been from the Valv, Olcese, and Vedder sands. Now Eocene wells on 20-acre spacing make over 200 B/D each from the 310 foot sand section.

From left to right are: J. P. Garten (chairman), Bob Pearce (Signal Oil & Gas Co.), Dave Hayward (The Texas Co.), Harry Keegan (Union Oil Co.), Floyd Schoonover (Monterey Oil Co.), and Max Taves (Richfield Oil Corp.).

Mr. Harry Keegan of the Union Oil Company described operational features of the Dominguez water flood. At present 5,000 to 6,000 barrels per day of oil field brine are injected at wellhead pressures varying between a vacuum and 1950 psi. Surface installations consist of a primary skim pond, an iodine recovery plant, chlorination facilities, an oil-water storage plant, a leaf type filter with filter aid and precoat, a clean water storage pit, a centrifugal charging pump, a Triplex fluid injection pump with aluminum bronze fluid end, and cement lined steel pipe leading to injection wells. The large scale water flood project with Union Oil Company, Shell Oil Company, and Dominguez Oil Fields Co. is scheduled to start in mid-summer of 1954.

Advancements Announced At G. P.

Mark H. Milam has been appointed manager of industrial relations for the General Petroleum Corporation refinery at Ferndale, Washington, it has been announced by R. E. Lauterbach, manager of manufacturing for General Petroleum.

M. T. Hamilton has been appointed safety superintendent of the manufacturing department, the post formerly held by Milam.

Milam is a veteran of twenty-four years service with General Petroleum. Until 1947, when he became safety superintendent, he was in gasoline plant and refinery operations. In his new position Milam reports to C. G. Cortelyou, manager of the Ferndale refinery.

Hamilton has been fire and safety supervisor for General Petroleum's Torrance refinery since 1950 and has been in fire protection work since 1946. He joined General Petroleum in 1938 in construction work. He will report to Lauterbach in his new position.

K. O. Emery, who for nearly 10 years has enlightened students at the University of Southern California in Los Angeles on marine geology, general oceanography and related subjects, was chief speaker at the recent paleontology seminar sponsored by the Bakersfield Evening School in the Kern County city.

N. P. R. F. C. A. Issues Report

A report has just been issued by Joseph E. Keller, Special Representative, to members of the N. P. R. F. C. A. and The Central Committee on Radio Facilities. It is of especial interest to the oil industry.

On February 3, 1954, the Federal Communications Commission directed a letter to Dr. William M. Rust, Chairman of the Central Committee on Radio Facilities of the American Petroleum Institute requesting that the committee furnish the Commission with information in connection with drafting proposed microwave rules and standards. The Commission made reference to Docket No.10500 and to the Central Committee's Comments in that Docket which urged, among other things, that the Commission adopt complete microwave rules and standards. In its letter of February 3, the Commission requested of the Central Committee, "as the representative of the largest single group of present users of private microwave systems and in cooperation with other groups as may be available . . . its analysis of the various operational communications requirements of the present known potential users of private microwave systems which could be satisfied by the use of frequencies above 890 megacycles; together with its analysis of the suitability of each of the available microwave bands above 890 megacycles for these purposes." In addition, the Commission went on to ask the Central Committee to advise the Commission of its proposal insofar as microwave engineering standards are concerned. This information was requested by the Commission pursuant to its plan to form a joint study group "in the near future for the purpose of considering microwave rules and standards . . ." At the same time, the Commission directed a letter to the Radio Electronics Television Manufacturers Association also requesting certain technical information to assist the Commission in formulating microwave rules and standards. The Commission stated in the RETMA letter that "it would be greatly appreciated if RETMA would tabulate and furnish the Commission, with respect to each microwave communications frequency band presently in use above 890 megacycles, the critical operating characteristics of the various equipments now installed, or available, from the standpoint of possible mutual interference between stations or equipments."

The Central Committee filed Comments with the Commission in Docket No. 9703, in the matter of revision of the Rules Governing the Special Industrial Radio Service. Since the petroleum service companies are licensed for radio facilities in the Special Industrial Radio Service, the Central Committee, as representative of the petroleum industry in its radio matters, had a real interest in commenting upon the proposed rule changes in this docket as they affected these service companies. Specifically, the Commission proposes to eliminate the present territorial restriction from the operation of such service and trade organizations eligible for licensing in this service. These comments supported the removal of the restriction which limits the area of operation of the service companies to areas outside of metropolitan divisions. Then also, the Central Committee asked the Commission to remove this same restriction from the category of licensees which include petroleum marketing and distribution activities—i.e. L.P. Gas Dealers. The Liquefied Petroleum Gas Association, Inc. also filed comments in this docket which likewise recommended that the Commission remove the proposed territorial restriction that limits the operation of L.P.G. dealers to areas other than standard metropolitan areas of 50,000 or more population.

The Halliburton Oil Well Cementing Company, Duncan, Oklahoma, also filed comments in this Special Industrial Radio Service docket. These comments, along with a large number of others, opposed the proposal which would prohibit base stations from relaying messages of immediate importance to mobile units. Halliburton also requested that the proposal to restrict all temporary base stations to a certain group of allocated frequencies not be adopted so as to "permit a company with an established radio system to use the frequency of its permanent stations when it establishes temporary stations."

The Federal Communications Commission announced on February 4, the appointment of Mary Jane Morris as Secretary of the Commission, effective February 8, 1954. Miss Morris was a member of the Legal Staff of the Commission in the Office of the General Council since 1948.

The Commission released figures which indicate that the time required for processing applications in certain of its services has been considerably reduced in the past month. For example, while the average time for processing an application in the Industrial Radio Service was fifteen days in December, 1953, the average time was only seven days during January, 1954. It was also revealed that the number of applications pending in the Industrial Radio Services was reduced from 680 actions to 507 actions from the beginning to the end of January, 1954. As for the Petroleum Radio Service, 182 applications were received by the Commission during January, whereas 264 applications were disposed of. Thus, 136 applications were pending in this service at the end of January, as compared to 218 at the beginning.

The Federal Communications Commission granted the petition of the Central Committee requesting an extension to March 15 of the time for filing comments in Docket 10797. This request for extension was made so that the comments would not have to be filed until after the February 24 meeting of the Microwave Frequency Coordinating Council in Chicago. This docket is in regard to frequency allocations above 890 megacycles.

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Latest type high conversion UOP Fluid Catalytic Cracking Unit installed at the Denver refinery of The Bay Petroleum Corporation.

MODERNIZATION PROGRAM AT BAY DENVER NEARLY DOUBLES CRUDE CAPACITY

By C. O. Garbrecht, Vice-President
The Bay Petroleum Corporation

A sweeping modernization and expansion program completed at a cost of several million dollars at our Denver refinery has enabled it to nearly double its crude capacity while at the same time substantially increasing the overall yield of refined products and greatly improving the quality of those products.

C. O. Garbrecht

Our program, which made the refinery at Denver one of the largest in the Rocky Mountain region, was centered around the installation of the latest type high conversion Fluid Catalytic Cracking unit designed by Universal Oil Products Company. The unit has a design capacity of 3,528 barrels per day of fresh feed stock at 76 per cent conversion. The design coke burning capacity is 3,770 pounds per hour.

Coincidental with construction of the cat cracker the Dubbs thermal cracking unit was converted into a visbreaker-vacuum unit for preparation of cat cracker feed stock. A crude topping unit, gas concentration plant, and a polymerization unit also were redesigned, enabling us to make the maximum use of existing refinery equipment.

Universal Oil Products Company designed and engineered the new cat cracker and redesigned existing equipment, while all construction work was handled by Procon Incorporated.

Crude Capacity 11,000 Bbls.

Through these changes, our refinery at Denver which previously processed 6,000 barrels of crude oil daily now handles 11,000 barrels daily, and it is marketing a premium gasoline which is specifically tailored to meet the requirements of high altitude driving.

In our modernized refinery operation, the converted crude unit processes a blend of Wilson Creek, Wellington, and Lance Creek crude oils. A light straight run gasoline, naphtha, kerosene, Diesel fuel, gas oil and reduced crude are prepared from this blend. The latter material forms the charge to the visbreaker-vacuum unit.

Charge to the visbreaker is cracked lightly on a once-through basis before being discharged into a flash chamber. Vapors which are formed there are fractionated into a gas and gasoline overhead and gas oil bottoms. The gas and gasoline are sent to the cat cracker gas concentration unit for further separation and recovery.

After being heat exchanged against crude and then cooled, gas oil bottoms are sent to storage, where they are picked up along with other gas oil streams. The mixture comprises the feed stock for the cat cracking unit.

Bottoms from the visbreaker flash chamber are vacuum flashed in another tower. Vacuum gas oil is condensed and sent to storage as part of the cat cracker charge stock, while visbroken and vacuum flashed pitch is cut back with cat cracker cycle oil to meet No. 6 fuel oil specifications.

Gas and gasoline produced in the cat cracker undergo further processing in the gas concentration plant, which prepares feed for the revamped poly plant, as well as debutanized gasoline. Excess light gases are vented to the refinery fuel system.

Recoveries Run High.

Recoveries of light end materials from the gas concentration system have been found to be exceptionally high, averaging more than 85 per cent on the propane-propylene fraction and nearly 100 per cent on the butane-butylenes.

The gas concentration unit is divided into four sections—a primary absorber, a secondary absorber, a stripper and a debutanizer. Low pressure gas from the cat cracker receiver is supplied to the primary absorber. Condensate in the cat cracker receiver is the absorption medium for this column.

Gas from the primary absorber is sent to the secondary absorber, whose absorption medium is cycle oil from the cat cracker fractionator. Primary absorber bottoms are stripped before being debutanized. Debutanizer overhead is charged to the revamped poly plant, while debutanizer bottoms are sent to cat cracked gasoline storage.

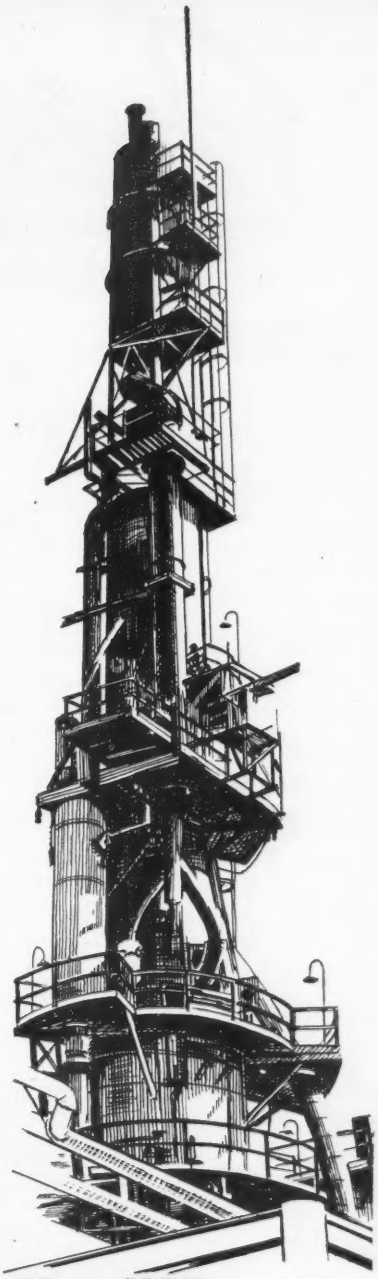
Idle Equipment Used.

Effluent from the poly plant is used as part of the unit's recycle. Because additional heat exchange was needed due to the increase in crude capacity, finned tube sections removed from idle units in the refinery were added to the poly plant.

The poly plant's effluent is depropanized. The net overhead is charged to a de-ethanizer, where LPG is prepared as a bottoms cut.

Depropanized polymer is stripped and excess butane is removed overhead. A 10-pound polymer is produced as a bottoms fraction.

We feel that the constantly increasing demand for our new cat cracked products more than justifies the expenditures we made in modernizing this refinery and making it the finest in Rocky Mountain Area.



New UOP Fluid Cat Cracker for Bay Denver

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Field Development

Standard Continuing Rosedale Development

Standard, which has just embarked upon another development well in the Rosedale field, No. 18-1 on Section 1-29s-26e, has locations staked for three additional jobs. They are No. 43, No. 47 and No. 83. All, including No. 18-1, are on the Kern County Land Company 31 lease. The company also has five wells going at the present in the field. Along the eastern border of the Lost Hills field, Standard's Galbreath No. 14 on Section 20-26s-21e is drilling under 3200 feet toward objective depth of approximately 4000 feet. Location is one-half mile east of a duster taken down a year ago by Pacific Western to 2726 feet. The company's CCMO No. 4-25 wildcat on Section 32-11n-19w has been redrilled and cored to below 9800 feet. The well was plugged back for a redrill after going to a total depth of 13,229 feet.

In the Buena Vista area, J. D. Manley is working with his wildcat venture on Section 19-31s-23e beneath 5400 feet. The production target there is the Stevens oil sand zone anticipated near 6500 feet. The sector is perhaps better known as the Globe Anticline.

Temblor Vista Test

No great distance from the Cymric field, Superior Oil's Superior-Anderson No. 31-30 wildcat on Section 30-29s-21e at Temblor Vista is exploratory drilling at 3800 feet. Two miles southwest in the Temblor sector, Jet Petroleum Company has abandoned its cable tool job, Jetco No. 2 on Section 26-29s-20e.

The productive limits of the South Coles Levee field has been pushed to the east by successful completion of Kern County Land Company's KCY No. 38X-1 extension test on Section 1-31s-25e. The well was completed at a total depth of 10,143 feet in the F-2 sand of the Stevens zone for an initial output of 178 barrels of 33.6 gravity oil and 200,000 cubic feet of gas a day. The new producer is short of two miles northeast of Ohio Oil Company's field discovery of 1938. It probably will graduate into the unit plan prevailing in the field and operated by Ohio. Richfield's CL No. C-32-2 well on Section 3-21s-25e, a new field producer, is making a surprisingly poor showing. Taken to a total depth of 10,107 feet, the well at last word was pumping less than 10 barrels of 32.9 gravity oil a day.

Shafter Test Deep

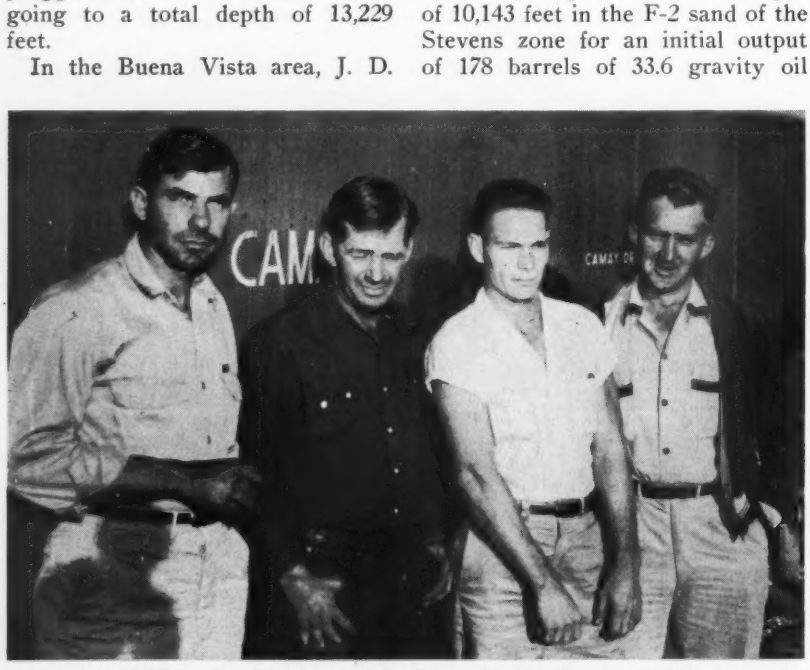
Any guess is as good as another on what Tide Water Associated may have penetrated of interest with its no dope well west of Shafter drilling below 11,500 feet. Tagged Tide Water-Capital Co. No. 54-18 and located on Section 18-28s-25e, unofficially the project is believed to have encountered good gas shows and maybe oil, too. Superior Oil has acquired new leases in the general area. Taken were the southeast quarter of Section 14-28s-24e and the southeast quarter of Section 24.

Wildcat work of Intex Oil Company one mile west of the Salt Creek field failed to pry out new oil on Section 13-29s-20e. This was verified when the company abandoned Flocker No. 1 on Section 13-29s-20e at 1270 feet. It topped the Carneros at 760 feet.

Seeking Eocene production in the Temblor area, Richfield's Dodds-Thomas No. 2 explorer on Section 23-20s-20e is in the drilling phase, with depth last reported near 1500 feet. This is the company's second test in the area. In Sunset Valley, the company has pulled out of its Moore No. 1 test on Section 32-11n-24w, after setting pipe at 4375 feet and testing with negative results the intervals of 4260-4330, 4110-4215 and 3420-3500 feet.

Greeley Field Pumper

On the southwest border of the



L. B. O. D.'s W-268 on Terminal Island with Camay Drilling Company putting down the hole. Left to right: Bob Mabry, driller; Jerry Basham, derrickman; J. H. Currin, floorman; Don Dechenne, floorman.

Greeley field, Standard has placed on the pump its newly completed KCL Lease No. 11A-58 well on Section 19-29s-26e. The 7-inch casing was set on bottom at 7877 feet in the well, slightly less than a half-mile west of the field discovery, taken down by Standard in 1936. Following a final test of a shallow interval from 2260 to 2280 feet, Shell Oil Company's Shell-Intex-Voight No. 1 wildcat on Section 4-28s-20e at Antelope Hills has been abandoned at a total depth of 11,500 feet. Oceanic Oil, likewise, has given up its Clinton Land Co. No. 1 test on Section 15-30s-29e on the west fringe of the Edison field. Drilling stopped at 3532 feet.

E. A. Bender's KCL No. 67-24 test appears to have widened the Ten Section field to the northwest. The well, on Section 24-30s-25e, is pumping from the intervals of 8071-8096 and 8152-8200 feet, but represenative gauge at this writing is not available. The lease covers approximately 600 acres.

In the Northwest Belgian Anticline area, Moriqui Exploration Company is preparing to drill Anderson No. 6 test on Section 15-30s-21e. On Section 23, Pacific Western's R-K No. 1 is digging at 3460 feet.

Oceanic Oil Company is all set to put down a new wildcat well in San Benito County's Lonoak district. The effort is the sequel to second abandonment of its Maggini No. 1 on Section 10-18s-9e at 4967 feet, following unsuccessful attempts to get back into the old hole. On the northwest quarter of Section 2-19s-9e and 13 miles northeast of King City, Standard's Eade No. 3-2 wildcat at Black Canyon is down 1800 feet and sidetracking fish. San Benito County prospective interest was slightly tarnished during recent weeks by well abandonments. Tide Water Associated's Breen No. 1 test, four miles northwest of Hollister, went into oblivion at 4591 feet. Other dusters recorded since the first of the year included The Texas Company's Nutting No. 1 on Section 32-12s-5e, which quit at 8360 feet. However, despite these setbacks, San Benito County continues to hold the favorable regard of many operating organizations and in the months ahead are likely to show increased field activity, rather than any related diminution.

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Merced Test Staked

Current wildcat operations of Richfield include a brace of wells taking the first steps in the vicinity of the town of Merced, Merced County. Southeast of Livingston, Central Counties Oil & Gas Corporation's Joseph No. 1 test on Section 25-6s-11e is busy in a primary degree. At Chowchilla, Madera County, Tide Water Associated has already got going with its Southern Realty No. 1-6 test on Section 6-10s-14e.

On ground two miles northeast of Alpaugh, wildcat operations of Geochemical Surveys with its No. 36-27 wildcat on Section 27-23s-23e have come to an end at an even 3700 feet. This Tulare County well evidently failed to come across any worthwhile shows to bottom. Near Terra Bella, McGreey-Neary Oil Company's No. 1 wildcat on Section 27-22s-27e has been completed at a plugged depth of 847 feet. Total bottom is 903 feet. The company's National Development Merzoian No. 1 on Section 22 at Deer Creek is ready for the final touch.

Mendota Test Begins

One engaging fact about J. K. Wadley's wildcat well just launched on cotton land owned by the Anderson-Clayton Company in the Mendota area of Fresno County, is that it introduces for the first time drilling in Township 13s and Range 14e. The drill site is on Section 20 or a half-dozen miles northwest from the town of Mendota and west almost twice that distance from the Gill Ranch field. The well, in which others share interests, is slated to go 6500 feet.

A half-mile northwest of Union Oil Company Spieler No. 27-26 producer, Standard is about to take the first cut of turf with its No. 85 extension test of the Guijarral Hills on Section 27-20s-16e. Standard will seek production from the Leda zone, which gave Union's Spieler well an initial output of 1250 barrels of 37 gravity oil and 801,000 cubic feet of gas a day. Union, by the way has inaugurated deepening operations with Allison No. A-81-34-8 on Section 34-20s-16e, which was originally taken down by Sunray Oil Corporation and completed at 8296 feet in January of 1950. The drill site is

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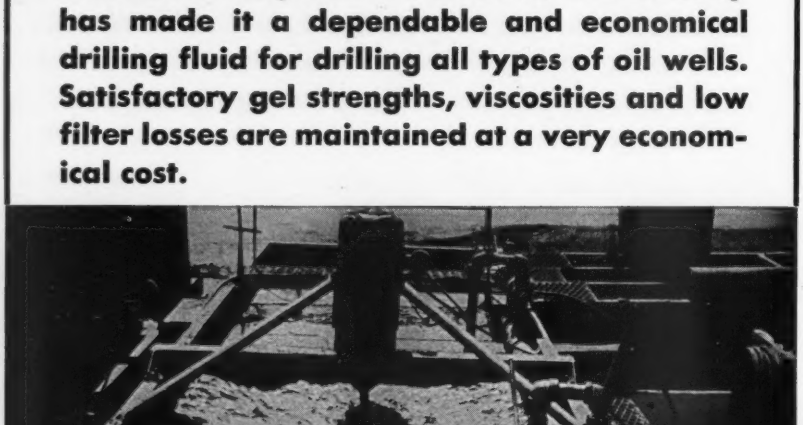

BROWN MUD COMPANY

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two locations south and the same number west of the big Spieler well. Two locations east of the Lloyd Harnish discovery well, Standard's No. 33F-3 on Section 33-20s-16e has been completed at 8405 feet. North of Cantua Creek, Franco Western Oil Corporation's Shiells No. 1 on Section 4-16s-15e has reached 7200 feet and is going deeper.

Shallow Find

Caminol Company has chalked up new shallow production with its Dagany Gap No. 1 wildcat well on Section 33-24s-18e in the Pyramid Hills of Kings County. Situated on Section 33-24s-18e or two miles southeast of Reserve Oil and Gas Company's McLure Valley discovery, the project went to a barren 4890 feet before it was given the final touch at a plugged depth of 890 feet. Open or about 90 feet of sand is six intervals from 703 to 855 feet. Reserve's Reserve-Mitchel-Orchard No. 38-20 on Section 20-24s-18e stopped drilling at 1250 feet, ran electric log and then was abandoned. One-half mile northwest of production, Reserve is drilling its Reserve - Mitchel Westlope No. 24-20 on Section 20 at a relatively shallow level. Standard's Avenal Land & Oil Co. No. 22 wildcat found nothing commercial and has gone the way of all dusters at 3878 feet on Section 13-24s-17e. Another test of the general area is ready to drill under the banner of Norris Oil Company on Section 29-24s-18e. The well is labeled Oceanic - Franco Western - Bayliss No. 52-29.

Tideland Drilling Interest Advanced

New and momentous oil exploratory action is drawing near for California's tidal lands. The latest area introduced into the conceivable development of petroleum is offshore Santa Monica, where a number of leading operators are seeking proper authority to drill.

Standard Oil Company of California some months ago let Santa Monica officials know of its interest in searching for oil about a mile offshore the resort city. The company told the Santa Monica City Council that prefatory geophysical survey pointed to an oil-bearing structure beneath the ocean.

In common with a number of beach cities, Santa Monica owns its tidelands seaward for three miles. Standard, whose El Segundo refinery is not many miles from Santa Monica, is ready to expend no less than $2,000,000 for preliminary exploratory work.

Standard apparently was the first to suggest to Santa Monica the notion of drilling on steel islands in Santa Monica bay. However, meantime other companies have evidenced interest and the city council probably will call for open competitive bidding.

Referendum Vote

Be that as it may, final determination would rest with the people in a referendum vote because of an ordinance of the Santa Monica books. The statute shuts the door to oil drilling in the city and the city limits, which under special circumstantial rights given in 1917, extend into the ocean to the traditionary limit of three miles.

South of Santa Monica at Redondo Beach, the City Attorney is preparing an ordinance designed to shape the basis of an election to resolve potential drilling for oil below the city tidelands. It will be presented to the City Council and is written to protect interests of Redondo Beach in the proposed yacht harbor and to safeguard other restrictions considered expedient by civic authorities in case an election eventuates and drilling contracts approved. Oil operations in the western sector of the city are currently prohibited by an initiative ordinance adopted in 1935.

Seal Beach Test

Within the next few weeks the ranks of new tideland exploratory wells should be swelled by Monterey Oil Company's venture on a steel and concrete island a mile and one-half offshore Seal Beach. Delayed close to a year by legal technicalities, actual drilling probably will be set in motion in April.

Monterey originally gave thought to island drilling way back in 1944 and in 1947 made formal application for a drilling permit. However, necessary Federal and State sanctions did not become a reality until 1952.

This type of drilling island as yet appears to have no counterpart in California or elsewhere.

Up Santa Barbara way, additional tests have been granted to oil concerns to engage in seismic work offshore that part of the California coast. The Santa Barbara City Council asked the State Lands Commission that geophysical operations be kept away from the Hope Ranch, Montecito and Santa Barbara areas. Santa Barbara's objection to oil exploration is due to fear that such activity might lead to marring of recreational facilities.

General Exploration Company is drilling below 2000 feet with its CCMO No. 2A on Section 17-2s-12w in the Bandini area, after skidding rig from the abandoned CCMO No. 2. Location of the current job is only a couple of feet east of the duster, which for a time looked good before tests proved it non commercial. In addition to General Exploration, Union, Basin, Bolsa Chica and C. G. Willis hold interest in the play.

Atlantic Oil Company's wildcat effort in the Santa Monica Mountains, represented by Nettleship No. 1 on Section 30-1n-16w, continues to probe deeper for production around 3600 feet. The derrick stands on the east side of Topanga canyon road, approximately two miles south of Ventura boulevard.

In the Castaic country, drilling has reached 5500 feet and is proceeding on down in Seaboard Oil Company's Wickham-USL No. 84-34 wildcat well on Section 34-5n-17w. International Drilling Company is in charge. No 53 on Section 23-2n-16w at Northridge is making hole beneath 5900 feet under the guidance of Terminal Drilling Company.

Between the Signal Hill and and Dominguez fields, The Texas Company has abandoned its Carson NCT-1 No. 1 on Section 12-4s-13w. Drilled to a bottom of 11,373 feet, the 7-inch casing set at 10,114 feet was pulled. At Charlie Canyon, Texaco has spudded its Yule No. 1 on Section 30-5n-16w.

Completed at 3764 feet, Hearn Company's Reilly No. 1 wildcat in the Sansinena area started off on the pump at the rate of 50 barrels a day. Southwest of Blythe, Campbell, Egger and Rottman's Federal No. 1 exploratory well on Section 6-11s-21e is down about 1300 feet.

With Holmes Drilling Company in charge, Jack B. Crawford's Huntington No. 1 test on Section 11-6s-11w on Huntington Beach wildcat ground was last reported digging at 4405 feet. On the same section, Southern California Petroleum Corporation has started Gerhart No. 1. East of Huntington Beach, Pacific Supply Cooperative's Lamb No. 3-6 wildcat on Section 6-6s-10w has gone into limbo at 5850 feet.

Corona Test Digs

The most recent information from Corona indicated H. and W. & Associates, Ltd., is drilling not far above 1000 feet with Marie Boyd No. 1 explorer on Section 28-4s-6w, Riverside County. The Texas Company is working in the earlier stages with its Stone NCT-1 No. 1 prospect job on Section 35-3s-5e at Edom Hill.

In San Bernardino County's Yucca Valley area, Retari Company is above 500 feet with its wildcat on Section 25-2n-5e as this is jotted down.

Monterey Oil Company, owner of substantial production in the Signal Hill area, is preparing to take down two new wells in the 1200 and 1300 blocks of Spring street. They will explore to some 5000 feet.

One of the oldest oil areas in Los Angeles and Southern California may be in line for a fresh and interesting development. This was learned the other week when the Los Angeles City Council was given a report by its planning commission that it would be within proper economic reach to drill in the old Crown Hill district. It was pointed out that wells in the district at present are pumping with primitive equipment and by instituting deep and directional drilling oil may possibly be drawn from below the ground on which the City Hall rests. The area spreads over 37½ acres stretching from College street just west of Figueroa freeway to the intersection of Chavez road and Lilac Terrace south of Elysian Park. The planning committee report evidently has the support of the Los Angeles City Planning Commission. It was in 1892 when Los Angeles hailed its first oil well. Carried to only 145 feet, the well at Colton and Patton streets, off Glendale boulevard, started at a rate between 10 and 12 barrels of crude oil a day. It cost only $50 to drill and the oil produced was hauled by horse and buggy to a pipe factory and used to paint tubular goods. In a short time wells were everywhere in the area and the field was gradually extended from north Broadway, near the southwest corner of Elysian Park, to the vicinity of Westlake Park, now MacArthur. The field was composed of three separate and

Delaney Petroleum Company well, McCrindle No. 1, being put down by Wells Drilling Co. Their crew, left to right: G. Graham, derrick; C. H. McFee, cathead; C. C. Marshall, floorman; W. C. Rutledge, welder; Sam Shrader, driller.

distinct production sectors, commonly known as the eastern, western and central areas, with the discovery well in the central part. Most of the wells were drilled to less than 1000 feet, but some were taken down to around 1500 feet. The deepest well in the field was near the corner of First street and Vermont avenue, which history credits with attaining a depth of 1735 feet. Seven years before the Los Angeles field was opened, Stewart and McFarland drilled a well on the Hancock Ranch at the west border of the city. It was located on the edge of a large brea bed, but failed to encounter petroleum.

Camarillo Hills Wildcat Initiated

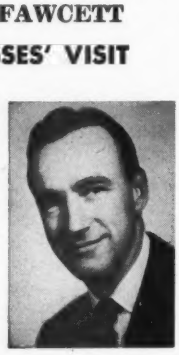
An integrant of men, skill and equipment has inaugurated Continental Oil Company's Janss No. 3 wildcat, 330 feet south and 1980 feet west from the southwest corner of the Lloyd lease on Section 22-2n-21w in the Camarillo Hills, Ventura County. An operating combination of Conoco and Union Oil Company took down two previous tests in the area without laying bare new oil. Their Janss No. 1 went to 10,170 feet, and Janss No. 2 to 6515 feet. In the Las Posas area, Continental's Berylwood Investment Company No. 1 on Section 18-2n-20w is drilling at 6600 feet, according to the latest advices.

Three miles south of Santa Paula, M J M & M Oil Company of San Francisco is getting ready to drill Hill No. 1 wildcat on Section 27-3n-21w for itself and others. Humble Oil & Refining Company, joint holder with M J M of considerable ground in the area, is a contributor to cost of drilling the venture. Santa Paula, Fillmore and the general terrain in that neighborhood have recorded much new leasing lately in which a number of leading operators were participants. Excitement in this direction sprang from Standard's Sespe Ranch No. 1 on Section 27-4n-20w at Fillmore, which unofficially is viewed as ferreting out consequential showings somewhere along the line. The project went originally to 14,503 feet and at present is redrilling near that depth. All news of developments at this location from official sources has been no more illuminating than sketchy to date.

The Lufkin Line

By VIC FAWCETT

THE BOSSES' VISIT



If you should be meeting Ed Trout for the first time, on his current visit to California, don't let the vice president title fool you—Ed is a salesman at heart.

Ed opened the California office in 1928 and remained here until 1942. In October of that year, due to World War II and all out effort, a transfer to Lufkin, Texas, "for the duration" became permanent.

But just to reminisce a little bit, Ed Trout didn't leave California and its then smog free skies for the Piney Woods of East Texas without having made a little history.

I believe the records will show that Mr. Trout introduced:

(1) the first worm gear oilfield pumping unit in California and at that early date, and for many years to follow, had the only adjustable sliding weight counter balance—covered by Lufkin patents.

(2) the first herringbone gears for greater efficiency. These replaced the pioneer worm drives about 1932—this major change proved to be another step in the right direction at a crucial period in Lufkin development.

(3) the first unitized portable twin crank units which emerged about the same time.

The year 1934 was also an "important" milestone in Lufkin's West Coast history as it was just twenty years ago this month that Ed Trout added the name of V. J. Fawcett to the payroll (it was more a milestone in Fawcett's history, since it was then that he began to eat regularly). Since Ed is well known for his humanitarian tendencies, no further explanation will be necessary.

Seriously though, through the years it has been a real pleasure to be affiliated with Lufkin and we of the California staff again welcome back to his old stomping grounds—Ed Trout—a good peddler, a good companion, a good golfer and a great coon hunter.

Vic Fawcett

(Lufkin produces the finest . . . Pumping Units . . . Gear Reducers . . . 2 Cycle Gas Engines.)

Ventura Avenue Work

Bolsa Chica Oil Company expects to get under way in the near future on a drilling program on its 60-acre Hartmann lease in the Ventura Avenue field. The deep rights on the lease for some years have been shared with British American Oil Producing Company. Bolsa Chica holds a 40 per cent carried interest. Recent completions of successful offset wells by other companies in the D-8 zone in the field at depths below 12,000 feet are analyzed by Bolsa as justifying immediate efforts to obtain comparable production on the Hartmann lease.

Six miles northeast of Camarillo, Sunray Oil Corporation is drilling under 8000 feet with its deepening job on Section 5-2n-20w in the Somis area. The company the other month acquired an interest in the well from the original operator—E. A. Parkford, R. C. Smith and Associates. Sunray as the new operator initiated fresh action at 7135 feet. More than 2000 acres are controlled by the group in the area.

Macson Oil Company's Strathearn No. 3 is in the primary stages on Section 6-2n-18w, and Strathearn No. 2 on the section is still idle at 420 feet. At Oxnard, Standard has brought drilling to a standstill in its Scholle-Livingston No. 1 test on Section 32-2n-21w. The project was carried to a total depth of 9433 feet before it was plugged back to 6700 feet for additional testing. On Section 1-1n-22w, the company's Lucas No. 1 test is down 9300 feet, but on the rack at that depth due to a fishing job.

Orcutt Test Quits

Following a run of electric log, the Los Nietos Company has abandoned its Madden No. 22-34 wildcat on Section 34-10n-34w in the Orcutt area of Santa Barbara County. A depth of 6798 feet told the story. In the Tar Springs Anticline area of San Luis Obispo County, the Nelson B. Hunt, Operator, Tar Springs No. 1 has undergone a formation test of the interval of 8546 feet to bottom at 10,010 feet. Recovery was made up of 3420 feet of heavily gas-cut mud with showings of oil. There was no free oil or water. The drill site is in Section 25-32s-14e, eight miles east of the

Arroyo Grande field. A depth of 8545 feet is the 7-inch casing setting point.

The Texas Company has three interesting wildcat wells beginning in Ventura County area. They are Baker-Hunter No. 1 on Section 31-4n-18w, northwest of Torrey Canyon; Kenneth H. Hunter River Ranch NCT-1 No. 1 on Section 36-4n-20w, south of Fillmore; and Miketta No. 1 on Section 21-2n-20w in the Calleguas area.

Beehive Bend Active

Just as the name suggests—Beehive Bend in Glenn County is busy as a bee and at the same time attracting the practical attention of new operators in gas possibilities there. One of the most recent organizations to join the Beehive Bend development campaign is E. L. Doheny, Operator, of Beverly Hills. A location for a wildcat has been staked on Section 22-20n-2w or about five and one-half miles northwest of production. General Petroleum Corporation has completed Navarro No. 1 on Section 26-19n-2w at 5406 feet for a yield comparable with its first well in the area, McGowan No. 1, which came in for several million cubic feet of gas daily. Approximately one and one-half miles northwest of the Navarro well, General is about to spud its third well Kimjones No. 1 on Section 14-19n-2w. Beehive Bend now boasts nine producing wells, spaced generally around a mile apart. Leasing still features activities in the district. Northeast of Princeton in Glenn County, a sour note was injected by the abandonment of Richard S. Rheem's Zumalt No. 1-20 wildcat on Section 20-18n-1w. The project was written off at 5500 feet.

Abandoned last April at 4500 feet by Artnell Oil and Gas Company, Inc., Hansen No. 1 on Section 18-6n-5e south of Freeport in Sacramento County is being paid a return visit by the same operator. It is going deeper.

In the Sutter Basin of Sutter County, Marshall Brown of San Francisco is approaching spudding-in time with his wildcat on Section 35-13n-3e. It is likely to look over all formations as deep as 5000 feet.

At Oxford in Yolo County, Brown Drilling Company as contractor is digging below 3600 feet with Humble Oil's DHP No. 1 wildcat on Section 28-6n-3e. In the Saxton area, General Petroleum's Glide-Court No. 1 test on Section 10-7n-3e is scheduled to go 14,000 feet and at last reports had some 400 feet to reach that level. Hayes & Sprague is in charge.

You see business has been so darned good that it keeps me kinda tied down doing the paper work, and running the show—so I don't get out in the oil patch as often as I'd like to. ★ And it's sure amazin' how we've been selling those Web Wilson Tongs, Elevators, TIGER TOOTH Tong Dies A-N-D that super-dooper HYDRA HOOK. ★ I've got some mighty good boys to give you real service, and I hope you'll call 'em when you need anything . . . there's Wally Hayes in the Valley, at Bakersfield 2-2376 —and George Winterburn at Santa Paula 613ML. ★ They are easy to get acquainted with, so until I can get around to say "hello", just call any of them if you need something. Thanks a lot.

Ed. Slaughter

Studio Well Flows

Universal Consolidated Oil Company announces completion of its Twentieth Century-Fox No. 1 well in the Beverly field at a depth near 7000 feet for a yield of 525 barrels of 24 gravity oil and 500,000 cubic feet of gas a day. In use was a 15/64-inch choke. Flow was clean, except for a small amount of mud.

The company is now under way with preliminary work on a second well from the same "island" in line with orderly development of the field. Tankage and transportation facilities are under construction to handle the oil produced.

Mose: "Listen to me, Lawyer Bigbrain! My gal Daisy say I gotta' marry her 'cause she is going to have a baby. I sez I ain't de pappy. How 'bout dat?"

"Hmmm," said Lawyer Bigbrain, "let me look into dat."

He started thumbing through his big law book, and came up with this answer: "Sho do look lak you gwine to have to marry up wid dat gal. It says here on page 454, "If on de date of maturity, the maker of a note cannot be found, the last indorser will be held responsible.'"

Zephyr Oil Company's Memco No. 3 in the Wilmington field with Ben Owens Drilling Company handling the work. Left to right: John E. Lewis, floorman; James E. Moulder, floorman; John Brixey, driller; O. W. Pollock, derrickman; R. P. Jones, floorman.

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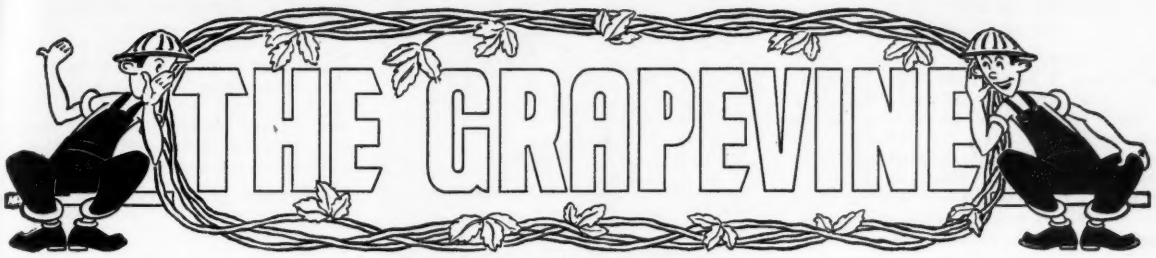

By RICHARD SNEDDON

For the past few days your correspondent has been the victim of one of the most dastardly series of attacks ever perpetrated on an innocent citizen. This season of inestimable suffering began in a Glendale sanitarium to which we had gone a short time ago for what was to have been a minor operation and all we have to say is that if this was a "minor" operation, heaven protect us from the majors. From the moment we showed up in the joint, nurses and doctors started converging in our direction, all with hypos in their hands, and all with the satanic gleam of hypophobia in their staring eyes. We were jabbed in every remote section of our anatomy, and so often that we finally acquired the permeability of a very coarse sandstone and the limpidity of a thoroughly relaxed oyster.

Each hypo stab sent us higher into the clouds, and as we floated about trying to pick up a stray angel, we occasionally tumbled back into fleeting intervals of consciousness, only to find another blonde nurse plunging another hypo into some hitherto unexploited anatomical area. The whole experience reached its fantastic zenith early one morning when a sailorish looking young chap in a white suit and sideburns slid us up on to a perambulating shelf, toted us along sundry corridors, and finally turned us over to a pair of white-masked bandits in a narrow hallway. These were obviously nothing less than the very top proponents of anesthetic mayhem, for they had the biggest hypos of all, and, boy, did they enjoy plunging them into our quivering torso! Thence we took off into the stratosphere in a most delightful assortment of aimless and unsupported flights, and when at last we circled back to earth, it was only to learn that we had been stabbed wantonly, repeatedly, and deeply, in a very delicate section of what we had always regarded as an extremely private bid of personal property.

We are still suffering tortures that the professional bone benders of other years would have been glad to know about. For example, our corpuscles seem to be chasing each other around in an endless succession of quite audible burblings and gurglings that make everyone, including strangers, sit up pop-eared—listening with embarrassing intensity! We are now in the inverse phase of the hypo cycle and can entertain a faint hope of eventual permanent release from the needle, but still have an irresistible tendency to scream at the approach of a blonde in a white nylon dress, and we have an awfully confused concept of the true order and exact nature of events during this adventuresome frolic. Concluding the entire sanguinary saga, we must admit, and with utterable sorrow, that our differential has definitely lost its new look. As a matter of fact, on the basis of present appearance, one would be justified in assuming that the thing has been "scrounged for" in one of these wayside sanctuaries to which old and broken autos are dragged when they have reached the peak of physical impotency.

It was fortunate, indeed, that before the foregoing cataclysmic shocks had wracked our meager frame, we were able to attend one of the most brilliant affairs ever staged by any increment of the petroleum industry at any time and for any purpose. This was the reception for His Excellency Celal Bayar, President of Turkey, and his entourage, tendered by Western Oil & Gas Association through its current president, Charles S. Jones, at the Ambassador Hotel on the evening of February 9, 1954. When we arrived at the Embassy Room at the appointed hour, we found the front section completely set apart in the form of a gorgeous floral bower, with the receiving line, headed by the always impressive Charlie Jones, being subjected to an unbroken barrage of western celebrity. His Excellency was flanked by a fairly long string of top ranking aides, many in uniform, and all wearing proudly the symbols of high office. Having paid our respects to the guest of honor, we went down the line, pretending a nonchalance that was completely non-evident in the bits of inanity we scrambled together for each distinguished and no doubt surprised guest.

Then we began to take stock of our travels and the one personality that seemed to have impressed itself most indelibly on our mind was the quiet, dignified little Turkish leader, Mahmut Celal Bayar. He doesn't speak a word of English, but Lieutenant Colonel Nurettin Alpkartal interprets beautifully for him, and there wasn't a soul in this large audience who didn't sit on the edge of his seat gulping eagerly for the interesting thoughts and ideas that formed in the fertile presidential mind and were translated into perfect English for our delectation by his very capable aide.

DRILLING INDUSTRY'S NO. 1 BENCH WARMER

D. J. "Jerry" Murray, assistant secretary of Bell & Burden, Inc., contract drillers, is a studious sort of chap who gives so much time to his multifarious duties that he doesn't have too much left in which to bat around the entertainment circuit with the boys. However, he is no stiff neck and knows how to have a good time as well as anyone when the circumstances are appropriate. He was born in Chicago, Illinois, but at the age of 5 years fell for the Los Angeles Chamber of Commerce propaganda and hightailed bravely out into the west. Here he grew up in San Francisco and Merced, and in the latter city had the great distinction of playing utility outfielder with Carl Zamloch on the Merced Bears. Carl was the coach of this lusty nine for which he must have drawn down a pretty staggering retainer. In any case, after every Sunday game, Jerry picked up $2.00 in silver as his share of the loot, and in the post mortem that always followed at the Guy Hansard pool hall, no one jingled his emolument with deeper satisfaction.

After doing a bit of work for Standard of Cal. in San Francisco as a hall boy (should have been "ball boy"), he went back and attended University of Illinois College of Commerce, and having sharpened up on the three r's, returned to Los Angeles where he accepted a post in the cost department of Associated Oil Company. Then over a considerable period of years he garnered a varied experience with Petroleum Equipment Company, Continental Oil Company, and KNDA. He was with KNDA from the time of its founding in 1931 on plant and equipment accounting but left to do a stint for Uncle Sam in 1941 and when he returned from that seige, tied up with Bell & Burden, Inc., and is now very comfortably ensconsed as assistant secretary, office manager, and statistician extraordinary.

Jerry is a coordinator of many things, and his interests are everywhere that a Bell & Burden rig operates. Hours mean nothing to him. He can stay up all night on a rig out in the hills or stand by through the "wee sma" hours at the office until a critical operation has been successfully completed, and hence knows all the anxieties of fatherhood although he has had no children of his own. Jerry and his good lady live out in Whittier where the few spare moments he can muster are spent painting and planting around the place. He is a member of the Petroleum Club and the Petroleum Production Pioneers, and his favorite exercise is handball—a lovely way to make a hamburger out of a hand. He is a pretty modest lad who claims to have made his best baseball contribution as a bench warmer and frankly admits the only card trick he ever learned from Carl Zamloch was to pick up the chips when he had a winning hand.

It should be mentioned that after exchanging greetings with as many other guests as we could reach during the cocktail hour, we followed the Turkish delegation into the dining room and there received another eye-opener. The entire dining room was a blaze of flowers, too, with the honored guest and honorable guests seated as a raised table over which hung large floral pieces representing the flags of the U.S. and Turkey. And on the tables at each place were more different kinds of wine glasses than we knew existed. During the ritzy dinner that was served forthwith, we drank toasts to all sorts of interesting people and projects in Estilo Amontillado, pale dry sherry, Pouilly Fuisse 1949, Romanee Conti La Tache 1937, Dom Perignon 1943, and Janneau Grand Armagnac. All of which built what might have been just another dinner into an epicurean adventure of prodigious dimensions.

Meantime Mayor Poulson extended the greetings of the City of Los Angeles to His Excellency; Charlie Jones formally wished him the most of the best from WOGA, and John Anson Ford, chairman of the County Board of Supervisors, presented a concise neatly couched little eulogy of which we would have been really proud to be the author. And we musn't forget to note that whoever had the bright idea of securing the services of Dr. J. E. Wallace Sterling, Stanford president,, as toastmaster, is by all means to be congratulated. We had never heard the gentleman before, but what he said and did on this occasion we liked terrifically. His diction and enunciation are refreshingly crisp and clear, and there is never an unscheduled pause in his brilliant pronouncements, introduction and comments. He has an infectious sense of humor and an aura of genuineness that reaches out and envelops his audience like the rays of the warming sun. The TV people are certainly overlooking an outstanding personality here.

The speaker of the evening was Honorable Paul G. Hoffman who delivered a scholarly address on the cultural and industrial development of Turkey over the past few hundred years. He paid high tribute to Kemal Ataturk for all the wonderful reforms he had instigated, reforms that have since brought his beloved country to a keen recognition of its own potential in the scheme of nations. He was highly commendatory of the performance of President Celal Bayer, who has carried on in the tradition of Ataturk and is now gratefully recognized by all free nations as the true guardian of democracy in the Middle East.

The benign little President who has a great deal more backbone than most taller men, acknowledged all the greetings and adulation with becoming modesty. He delivered himself through his interpreter of some interesting little parables, poked a bit of sly humor at the multiplicity of millionaires in American oil, but gave quite patent evidence of the fact that he was loving every minute of his visit in the United States. And we'll say this for His Excellency, every man in the ritzy audience of 250 that attended the WOGA reception had fallen completely in love with him before the affair was over. In all aspects, it was one of the most distinctive affairs in which we have ever participated, and we heard that same remark repeated many times by others.

We sat at dinner with Norman Simmonds, assistant to C. S. Jones, Hampton Smith, the consulting chap who has just returned from a

three months stay in Turkey; and Jim West, the lands and leasing genius, who goes over with his wife and daughter in March. Others we noted scattered about the gorgeously arranged Embassy room were Henry Salvatori, Western Geophysical Company president; Sam Mosher, president of Signal Oil & Gas Company; Olen Lane, vice president Continental Oil Company; Bob Smith, legal counsel, and Dick Borden, California area manager, Sunray Oil Company; Bill Stewart, executive vice president, Union Oil Company; L. L. Aubert, president, Bankline Oil Co.; Stark Fox, executive vice president, Oil Producers Agency; John W. Hancock, president Hancock Oil Company, R. L. Minckler, president General Petroleum Corporation; and Tom Wallace, vice president, and Jim Leovy, legal counsel, Western Gulf Oil Company.

Then there were Lowell Stanley, chairman of the Board, and Howard C. Pyle, president of Monterey Oil Company; Torrey Webb, vice president of The Texas Company; R. R. "Dick" Von Hagen, president Lloyd Corporation; Frank Morgan, Dave Day, and Bill Travers, all Richfield vice presidents; A. C. Rubel, vice president, Union Oil Company; Chum Nelson, former Union Oiler; Ralph Parsons and Milt Lewis from the Ralph M. Parsons Company; John Thacher, vice president, Standard of California; Wm. Reinhardt, vice president, Union Pacific Railroad Co.; Bob Harcus, executive vice president Byron Jackson Company; Bill Powell, president Emsco Manufacturing Company, and approximately 200 others to whom our profound apologies for being so unobservant as to miss them, or for having such a poor memory as to forget them. And here we conclude a very weak attempt to chronicle a very momentous event. WOGA did a bang-up job of arranging the details and Charlie Jones did a beautiful job of keeping the whole affair on a dignified plane without himself being either stuffy or obstrusive. Congratulations to all who contributed to its success, and our best wishes to Celal Bayar and his party as they wend their way back to continue their good works in the cause of democracy.

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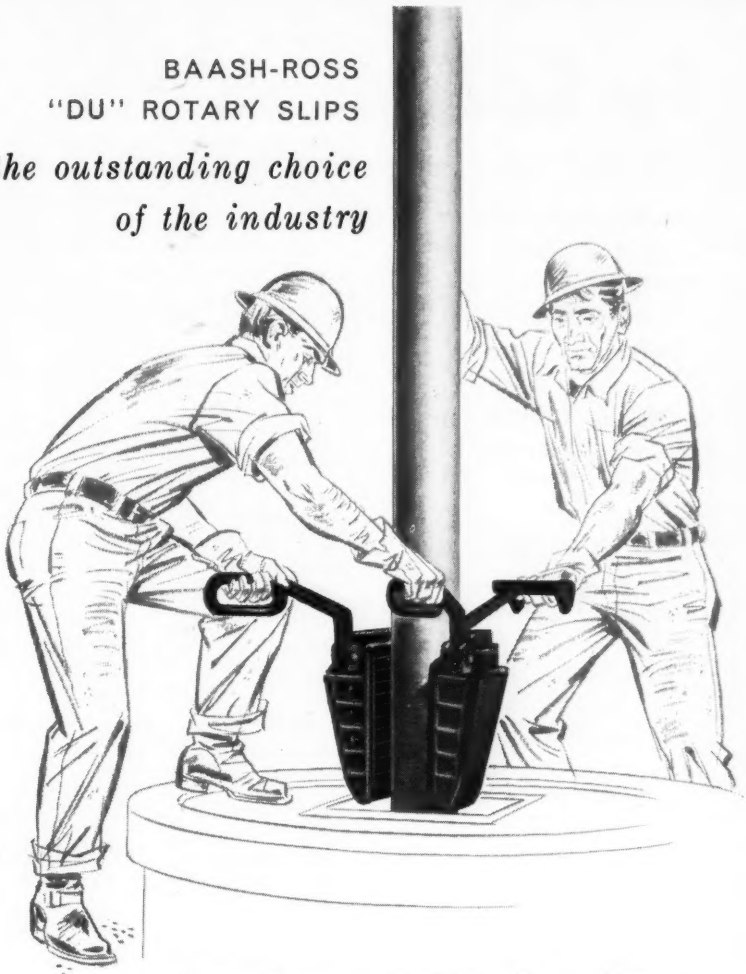

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Now diverging briefly, it is interesting to learn that James V. MacDonald, proprietor of the stiffest left arm in western golf, recent rediscoverer of the Hawaiian Islands, former Chain Belt higher-up and past Big Shot of the Nineteeners, has tired of idleness and inertia and will thenceforth indulge his yen for investments in oil lands and leases. Jim retired from Chain Belt Company a short time ago after over 31 years with the firm. Prior to his CB connection, he had been superintendent of the Reward Oil at McKittrick, and even before that was with Associated Oil Company and Associated Supply Company. He is a chap with lots of rare good judgment, a practically unrufflable temper, and a priceless sense of humor, all of which make him mighty entertaining company. He is a senior member of the P.P.P.,

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the Petroleum Club, Wilshire Country Club, and the Nineteeners. The only thing that really makes Jimmy mad is to lose at gin rummy, but he hasn't done it yet, so we still don't know how he behaves when he is angry.

The Petroleum Club is boiling like bathtub brew since Dave Day took over and there are more ideas percolating than are dreamt of in all our philosophy. Contests of infinite variety are in the process of arrangement, and much to their delight, the wives of the members are going to play a more prominent role in arrangements for future dances, cocktail parties, etc. The new house committee consists of Basil Kantzer, the ceramist, chairman, assisted by Malcolm McDuffie, popular scion of a noble petroleum house; Ches Braly, world traveler and independent operator; Duke Follansbee, the Universal veep, and current prexy of P.P.P.; Jim McCabe, vice president in charge of Statler's western hotels; Milt Lewis, the Ralph M. Parson's biggie; and Ronald Swayze, the G. P. production executive.

Jim Kelley, the Macy Street Kaliph, has assembled an activities committee that includes such stoutly active individuals as Alexander Hamilton Bell, the Flintridge Bohemian; Ed Stout, the G. P. fashion plate; Reg Keans who would have made a lovely faro dealer for Tex Rickard if he hadn't become wound up in the lands and leasing business; Bernie Dresser, the Hancock Oil Company smoothie from Long Beach; Bo Weill, an entertaining delegate from the higher reaches of Ethyl officialdom; and Sam Bowlby, the Shell Oil Company veep, who has a natural hosting flair that equips him ideally for just such arrangements.

The membership committee consists of Continental's gentleman of distinction, Olen Lane, chairman; Vic King, young looking but thoroughly capable G. P. exploration executive; Tom Sherman, the Huntington State beau brummel whose speculative acumen is sharper than a two-edged sword; Tom Wallace, the friendly Western Gulfer, another sharpie in any form of uncertain enterprise, strictly not to be jousted by amateurs; W. C. "Bob" Roberts, the completely likable Shell pipe line executive; Don Grubbs, Oil Well Supply Co.'s top man out this way, and a lad who is growing fast in industrial stature in and around the village; Fred Behrens, the Wilshire Company refining genius and Santa Anita handicapper; Ken Kendrick, the universally known and admired Standard Oiler who is one of our top rationalizers; and George Tyler, the always pleasant western manager of the du Pont et Nemours oil services organization, or words to that effect.

The finance committee is a snug little coterie which will be under the chairmanship of A. C. "Cy" Rubel, the mini-motoring enthusiast from 7th & Hope Streets. Cy got rid of his MG recently when he ran under a duck with it. Incidentally, his assistants on the committee are Graham Polk, the tall handsome prexy of Time Oil Company; W. A. "Dub" Russell, the Seaboard Oil Company of Delaware accounting genius, and a meanie with a niblick when he is in good clod shaping form; Fred Hanson, vice president of California Bank, a supporting pillar of the San Gabriel Country Club, and probably one of the best known bankers in this part of the country; and last, a completely personable and crisply decisive chap, A. Safford Nye, treasurer of Richfield Oil Corporation.

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Union Oil Co. to Expand Oleum Refinery

Union Oil Company of California recently announced it has taken a five-year option to purchase 700 acres of land adjacent to the eastern boundary of its Oleum Refinery in Contra Costa county, California, for possible future expansion of facilities. Owners of the property are Linus and Edna Claeys.

"Completion of Oleum's portion of new units in Union's $40,000,000 refinery expansion program will largely use up the refinery's present available acreage" according to John Towler, manager of the refinery.

"To keep pace with increasing sales of Union Oil products," Mr. Towler said, "the expansion program is aimed at building facilities to produce more and higher octane gasoline from existing crude oil stocks."

Jeanne: "Tom and I drove past your house last night about midnight, but I guess you were not at home; the house was dark."

Pearl: "Just because the lights in the house were out, doesn't mean the current was turned off."

Rocky Mountain NEWS

Colorado—Idaho—Montana—New Mexico—Utah—Wyoming—Western Canada

Wyoming

An important gas strike in Fremont County has been made by Sinclair Oil and Gas Co., which is drilling the No. 1 Kirby Draw Unit, sw sw se 27-33-95w. A drill stem test of the interval 5504-65 feet recovered gas at the rate of 6,861,000 cubic feet per day. Stanolind Oil and Gas Co. has a major interest in the well. The well is scheduled as an 8000-foot Tensleep test.

Also in Fremont County, Sohio Petroleum Co. recovered 28 gravity oil at the rate of 174 barrels per day from the No. 2 Southeast Sand Draw Unit, se sw 36-32n-95w. The well was completed in the Phosphoria, top of which was logged at 8721 feet. The No. 1 Unit, a quarter of a mile northeast was originally brought in as a Tensleep discovery but because of the low gravity of the oil in that zone it was recompleted in the Phosphoria.

Among wells on the dry and abandoned list is Stanolind Oil and Gas Co. 3 Unit, c sw sw 16-48n-91w, in Washakie County. The well, drilled three and a half miles northwest of the unit discovery, was abandoned at 8161 feet.

Dakamont Exploration has staked location for a confirmation test after recovering seven and one half barrels of oil per hour from the Newcastle sand at the Sherwin Ranch wildcat No. 1 Govt., c ne se 21-41n-67w, in Weston County. The well was drilled to 8207 feet total depth.

Oil has been recovered from a new zone, the upper Cretaceous, in the Beaver Creek field of Fremont County. If commercial production is established, this will be the seventh producing zone in the field. Stanolind Oil and Gas Co. is the operator. The recovery was from the interval 4001-4263 feet at the No. 31 Unit, c nw nw 15-33n-96w.

Montana

Stanolind Oil and Gas Co. was drilling below 10,800 feet at the No. 1-E NPRR, c ne sw 21-20n-52e, in the North Bloomfield field of Dawson County. Operator topped the Red River formation at 10,760 feet. This formation has been productive in other areas to the north and south.

Lion Oil Co. is drilling the No. 1 Knight, c sw nw 29-14n-60e, in Wibaux County, as a tight hole and has not confirmed rumors of recovery of 1000 feet of free oil on a drill stem test of the Madison at about 9000 feet. A report of additional oil recovery from the Ordovician at about 10,200 feet also lacks confirmation.

Murphy Oil Corp. was preparing to drill two additional wells in the East Popular Unit Roosevelt County, after completing two producers in the north part of the unit. The wells brought in were the No. 34 Unit, c sw nw 17-29n-51e, and the No. 37 Unit, c sw nw 18-29n-51e.

North Dakota

The Dakota Drilling Co. will continue its scheduled test to the Silurian, expected at 6700 feet, after making good recovery of oil at a shallower depth at its wildcat in Bottineau County. Four hundred forty feet of free oil was recovered on a drill stem test of the interval 4092-4125 feet at the No. 1 Anderson, c se nw 19-161-81w. The producing formation is believed to be the Mission Canyon. The test is being drilled on acreage farmed out from Phillips Petroleum and Carter Oil.

A new extension of the Fryburg field of Billings County has recovered oil from the Heath sand the third well in the area to find oil in this formation. Amerada Petroleum Corp. recovered over 2400 feet of free oil from the Heath at the No. 1 Cheadle, c se nw 9-139n-100w. The drill stem test was at 8245-87 feet. The operator has up to this time been producing from

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the Madison in the Fryburg field.

In Mountrail County, William Herbert Hunt, a deep test east of the Tioga field. The wildcat, the No. 1 Dunham, c nw nw 24-155n-90w, was drilled to 11,116 feet total depth and was abandoned in the Silurian.

South Dakota

In the first commercial oil well in South Dakota, Shell Oil Co. has found production in two zones, in the Red River. The well is the No. 1 State A, sw se 9-21n-4e, in Harding County. Operator recovered 115 barrels of 36 gravity oil per day through perforations from the interval 8587-8600 feet. In another test at 8660-90 feet, the recovery was 135 barrels of oil.

Youngblood and Youngblood were drilling below 6825 feet at the No. 1 Anderson, c ne ne 26-21n-14e, in Perkins County.

Nebraska

Three miles from oil production in the Fleming field, Wytex Oil Co. has found good recovery from the J sand at the No. 1 Malley, sw sw ne 25-13n-50w, in Cheyenne County. Recovery was 3800 feet of oil and 540 feet of water on a 70-minute drill stem test at 4954-69 feet. There was no recovery from the D sand.

Two tests on the dry and abandoned list were the No. 1 O'Connell, E. H. Stone operator, sw nw nw 35-14n-50w, in Cheyenne County, and Shell's No. 1 Blodgett, nw nw ne 17-12n-55w, in Kimball County.

Colorado

Continental Oil Co. has drilled two interesting extensions of the Bobcat field in Washington County. A two-hour test of the No. 2 Selby, ne nw sw 9-1s-56w, recovered 27 barrels of oil from the interval 5187-97 feet. The flow was in the last 41 minutes of the test. In the second well, the No. 1 Harbert, ne se nw 9-1s-56w, operator recovered 4770 feet of oil in 45 minutes.

Petroleum, Inc. was running casing at its D sand discovery in Morgan County, the No. 1 Glenn-Brown, se se ne 35-2n-58w. Total depth is 5825 feet.

The Texas Co. was drilling below 6650 feet at its Rangely field test, the No. 70-32 UPRR, sw ne nw 32-2n-102w, in northwestern Colorado. It will test the Madison.

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Utah

In the West Bar-X wildcat in Grand County, R. W. Hancock recovered approximately 4,000,000 cubic feet of gas per day from the Entrada, at the interval 4087-4106 feet. The well is No. 1 Govt., c ne nw 21-17s-25e.

Western Canada

Important extensions of the Pembina oil field in Alberta have brought feverish excitement and predictions that the field will be the largest in western Canada.

The field was discovered last June when oil was found in the Cardium sand by Socony-Vacuum, Seaboard Oil, Honolulu Oil, Merrill Petroleums, and Cancoll Oil and Gas. Ten wells have been drilled since that time, all but one being producers, and 15 others were being drilled at last reports.

A stratigraphic test, the Shell Peers No. 2, found oil in the Cardium and Viking sands, for what appears to be an extension of the field. The test is 30 miles northwest of Pembina, but additional wells between this test and the original field are considered necessary before proving the extension.

Six and a half miles southeast of Pembina, the Seaboard-Great Plains-Baysel Buck Creek 6-15 recovered oil from the Cardium.

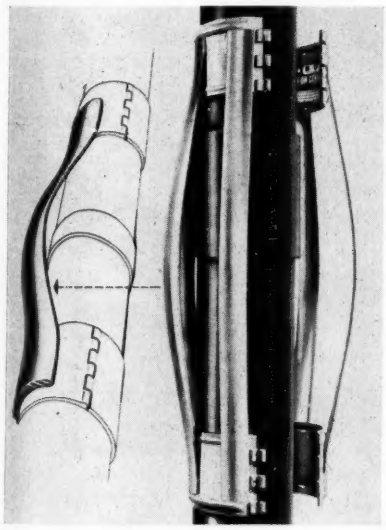
The Pembina activity figured in record Alberta land sales late in January, when the government received $31,675,041 in sale of crown rights. Texaco Exploration Co. paid a top of $13,125,000 for 92,160 acres north and west of the Pembina field, and Imperial Oil paid $11,087,533 for 92,160 acres farther north. Other sales were made in the general Pembina area.

Bishop Oil Co. has announced plans to drill five wells in the near future, with three of them in the Armena-Camrose field of Alberta, where the company has a Crown lease of 160 acres.

Southern Production Co. of Fort Worth, Tex., has signed an agreement with Canadian Atlantic Oil and associates for extensive exploration work in Alberta and Northern British Columbia. The agreement calls for an expenditure of $5,000,000. Southern Production will conduct the exploratory operations.

New KON-KAVE BOW on B and W Latch-On Centralizer

The centering ability of the B and W Latch-On Centralizer has been greatly increased with the introduction of the KON-KAVE bow. The curved cross-section of each bow provides greatest strength and most resistance to deformation or breakage. Higher quality spring steel is hot formed by drop forging, to exact specifications and the normal heat treatment to develop the full strength of the alloy spring steel is supplemented by a later special heat treatment that removes stresses caused by welding the bows to the end collars.



For further information write: B and W Incorporated, P. O. Box 5266, Houston 12, Texas.

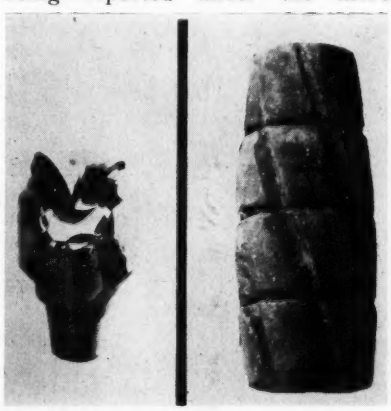
New Industrial Catalog

More than 40,000 items, many of them illustrated, are listed in the new Industrial Catalog recently published by the Howard Supply Company of Los Angeles and Oakland. Handsomely bound, this 844 page catalog will lie flat when opened to any page, and a simplified index makes it exceptionally easy to use.

New Security Reamer Cutters For Extremely Hard Abrasive Formations

Remarkable results are being reported from West Texas and New Mexico where the new Security chert-type reamer cutters are now in use. The new cutters are designed especially for reaming hard abrasive formations such as hard sandy limestone and chert where rock bits frequently lose gage before their drilling rate is materially reduced. The cutters contain six wide helical rows of teeth, each of which has two longitudinal grooves filled with Tungsten Carbide hardfacing. This feature coupled with the proven and desirable shearing action of the Security Reamer provides maximum life and the most efficient reaming as evidenced in the above photograph.

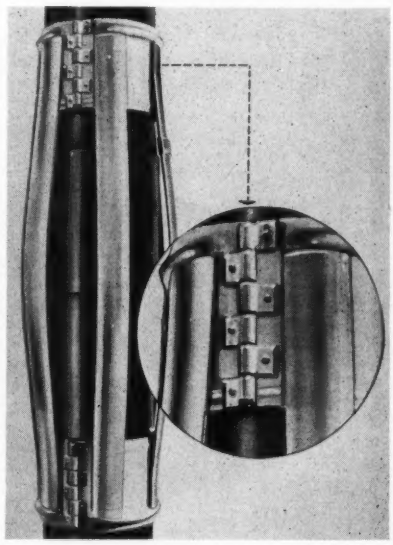
The reamer cutter (right), one of a set, was run in a Security Reamer directly above the bit. As can be seen, the bit (left) was far undergage. However, the hole was so effectively reamed to gage that new bit which followed went to within 2½ feet of bottom without reaming (distance from bit to reamer cutters). In other instances the new reamer cutters have been less than ⅛" undergage although the bits have been under as much as 1½". A substantial increase in the number of runs per set of cutters is also being reported under the more normal reaming operations.



Additional information on Security's chert-type reamer cutters may be obtained from any Security branch office or by writing Security Engineering Division, Dresser Operations, Inc. P. O. Box 30, Whittier, California.

New End Collar on B and W Latch-on Centralizer

The B and W Latch-On Centralizer was introduced in 1947 and was the first hinged centralizer.



The hinge structure has now been improved and the number of shear points more than doubled. Each element of the hinge is an integral part of the collar and the ends are securely welded to the collar. This construction is superior to the ordinary rolled hinge and makes the hinge the strongest portion of the end collar.

For further information write: B and W Incorporated, P. O. Box 5266, Houston 12, Texas.

Then there was the farmer who had such a beautiful hired girl that he just couldn't keep his hands off of her. He finally fired his hands and bought a tractor.

THIS

LAUGH OFF!!

He strutted into the bar and ordered drinks for everybody. When asked why he was celebrating he explained, "The wife just gave birth to a baby. I'm a daddy! Come on, everybody: drink!"

"What the hell are you bragging about," said one of the bar habitues. "It was a cinch for you. Your wife went through all the suffering. What are you so proud of?"

The new papa straightened haughtily: "Well I gave her the idea, didn't I?"

The driller was complaining about his wages:

"After you figure food, clothes and rent I have only $60 left for the necessities of life, and half the time they ain't hardly fit to drink."

Father Rabbit: "What's Junior so elated about?"

Mother Rabbit: "He learned to multiply today!"

The two girls were discussing various dates. "Why didn't you go to that good-looking fellow's apartment?" Mary asked Lou.

"Because," Lou replied, "all I get when I go to his apartment is rum and coax."

Middle Age: When women won't admit their age, and men won't act theirs.

"Do any of your boy friends try to go too far when they take you out driving?"

"Yes, they drive too far; it wastes time."

Jock McDoughal had blown his lassie to a movie and even hailed a cab to take her home. As they were riding along she, knowing his natural bent concerning money, remarked: "Oh, Jock it does make me feel awfully wicked riding like this."

At that Jock cheered up tremendously.

"Then, maybe," said he, "it'll be worth the money after all."

Old maids, it is said are born—not made.

Lucky Woman: One who has a cigarette lighter and a husband—both of whom work.

Co-ed (dreamily): "Did you ever see the man in the moon?"

Snake (absent-mindedly): "No, but I've seen a lady in the sun."

QUICKER SAFER PIPE CUTS WITH The BOWEN CASING CUTTER

The Bowen Casing Cutter is a precision tool for cutting casing, drill pipe and tubing. Ideal for use with Bowen Jars and Spears for all types of cut-and-pull operations. Simple to operate and won't slip down pipe after cutting begins. Withstands operating stresses at all depths. Can be set and released as often as desired without coming out of the hole.

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How "OVERWEIGHT" pipe SHRINKS pipe line budgets

Suppose your specifications call for 16" (O.D.) steel pipe with a minimum wall thickness of .141-inch. But the nearest wall thickness available from your pipe supplier is .172-inch. That 1/32-inch difference would mean almost 14 extra tons of metal in every mile of your line—enough for 1,159 more feet of pipe in the correct thickness!

You can keep "overweight" pipe to a minimum by specifying Armco Welded Steel Pipe. The wide range of diameters and wall thicknesses (including .141 and .172) make it easy to get exactly what you need. Write for data.

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